Appendix H
Short-list Option Appraisal Tables

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Project name	Sidmouth and East Beach Management Plan (BMP)			
Option ID	**S1**	**S2**	**S3**	**S4**
Overview/ Description	**A: Jacob's Ladder Beach and Connaught Gardens -** Option A.3 (maintenance of seawall, promenade and rock revetment including re-packing of rock). Supported by Option A.5 (Periodic removal of shingle from Jacob's Ladder Beach promenade area, with sediment placed to the west of the wall within this sediment cell). **B: Sidmouth Town -** Option B.2b - Maintain existing defence configuration. Repair and shorten length of both the current freestanding section of training wall and East Pier. Undertake periodic beach recharge to maintain volume to level of design beach, supported by ongoing beach recycling. Supported by Option B.6 (immediate repair to the River Sid training wall downstream of Alma Bridge) until the final option can be implemented. **C: East Beach -** Option C1.b – Construct 1 or 2 short/low level rock groynes about 150-200m east of the River Sid to aid beach levels controls as it transitions eastwards, supported by periodic beach recycling and recharge within Frontage B (assume in this instance 1 groyne only). **D: River Sid Western Wall -** Option D.1 - maintenance for as long as is economically viable then replace with a coastal standard wall.	**A: Jacob's Ladder Beach and Connaught Gardens -** Option A.3 (maintenance of seawall, promenade and rock revetment including re-packing of rock). Supported by Option A.5 (Periodic removal of shingle from Jacob's Ladder Beach promenade area, with sediment placed to the west of the wall within this sediment cell). **B: Sidmouth Town -** Option B.4b - Modify existing Bedford Steps, York Steps and East Pier rock groynes to make 'T-head' type groynes to retain sediment in small stable bays between each groyne bay and shortening East Pier groyne in the process. Support with periodic beach recycling and/or recharge to retain volume to give required design beach. Repair/replace training wall and shorten its length. Supported by Option B.6 (immediate repair to the River Sid training wall downstream of Alma Bridge) until the final option can be implemented. **C: East Beach -** Option C1.b – Construct 1 or 2 short/low level rock groynes about 150-200m east of the River Sid to aid beach levels controls as it transitions eastwards, supported by periodic beach recycling and recharge within Frontage B (assume in this instance 1 groyne only). **D: River Sid Western Wall -** Option D.1 - maintenance for as long as is economically viable then replace with a coastal standard wall.	**A: Jacob's Ladder Beach and Connaught Gardens -** Option A.3 (maintenance of seawall, promenade and rock revetment including re-packing of rock). Supported by Option A.5 (Periodic removal of shingle from Jacob's Ladder Beach promenade area, with sediment placed to the west of the wall within this sediment cell). **B: Sidmouth Town -** Option B.4d – Modify existing Bedford Steps and York Steps rock groynes to make 'T-head' type groynes to retain sediment in small stable bays between each groyne bay. Support with periodic beach recycling and/or recharge to retain volume to give required design beach. Remove East Pier rock groyne and training wall and place rock-armour around seawall where it curves into the River Sid. Supported by Option B.6 (immediate repair to the River Sid training wall downstream of Alma Bridge) until the final option can be implemented. **C: East Beach -** Option C1.b – Construct 1 or 2 short/low level rock groynes about 150-200m east of the River Sid to aid beach levels controls as it transitions eastwards, supported by periodic beach recycling and recharge within Frontage B (assume in this instance 1 groyne only). **D: River Sid Western Wall -** Option D.1 - maintenance for as long as is economically viable then replace with a coastal standard wall.	**A: Jacob's Ladder Beach and Connaught Gardens -** Option A.3 (maintenance of seawall, promenade and rock revetment including re-packing of rock). Supported by Option A.5 (Periodic removal of shingle from Jacob's Ladder Beach promenade area, with sediment placed to the west of the wall within this sediment cell). **B: Sidmouth Town -** Option B.5 – Remove existing beach structures and construct new offshore breakwaters. The number, position, size and height of structures to deliver option would only be known after modelling of the structures was undertaken as part of detailed design. Support with periodic beach recharge and recycling. Supported by Option B.6 (immediate repair to the River Sid training wall downstream of Alma Bridge) until the final option can be implemented. **C: East Beach -** Option C.7 – Construction offshore breakwaters tapering towards the eastern end of the study areas. **D: River Sid Western Wall -** Option D.1 -maintenance for as long as is economically viable then replace with a coastal standard wall.
Technical Issues	Existing rock revetment removed and re-packed on existing line as necessary along Jacob's Ladder Beach and Connaught Gardens together with general clearance of shingle off promenade area. Short term maintenance/repair of training wall until long term solution implemented when training wall changes will be designed to address scour at toe, risk of instability and measures to reduce wave reflection off sides of wall. Safety barriers to be upgraded/provided. At this time access for beach maintenance at East Beach will be improved by reducing the length of the training wall. Standard of protection from overtopping and defence erosion/failure improved to original design level along Sidmouth frontage as currently no beach re-charge undertaken. Creation of beach along toe of cliff aided by rock groynes and beach recycling reducing rates of cliff toe erosion.	Existing rock revetment removed and re-packed on existing line as necessary along Jacob's Ladder Beach and Connaught Gardens together with general clearance of shingle off promenade area. Additional rock to be imported as necessary to create T-head groynes. Short term maintenance/repair of training wall undertaken until long term solution implemented when training wall changes will be designed to address scour at toe, risk of instability and measures to reduce wave reflection off sides of wall. Safety barriers to be provided/upgraded. At this time access for beach maintenance at East Beach will be improved by reducing the length of the training wall. Standard of protection improved to original design level along Sidmouth frontage due to improved beach levels providing reduced overtopping and protection from scour/erosion. Complies with SMP policy as continues to hold-the-line along this frontage with river training wall forming boundary to hold the line frontage.	Existing rock revetment removed and re-packed on existing line as necessary along Jacob's Ladder Beach and Connaught Gardens together with general clearance of shingle off promenade area. Additional rock to be imported as necessary to create T-head groynes and to place around mouth of River Sid. Short term maintenance/repair of training wall undertaken until long term solution implemented when training wall will be removed and replaced by rock armour protection which helps to dissipate wave energy at River Sid entrance and reduces wave reflection onto promenade. This will provide greater access to East Beach for beach maintenance works compared to Options S1 and S2. Impact on SWW outfall to be considered – additional protection may be required to structure. Standard of protection to Sidmouth frontage improved to original design level due to improved beach levels providing reduced overtopping and protection from scour/erosion.	Existing rock revetment removed and re-packed on existing line as necessary along Jacob's Ladder Beach and Connaught Gardens together with general clearance of shingle off promenade area. **The number, position, size and height of offshore breakwater structures to deliver this option would only be known after modelling of the structures was undertaken as part of detailed design.** Offshore reefs will create salient/tombolos providing a more stable beach in front of the existing structures and in front of the existing cliffs which will reduce cliff toe erosion rates. Standard of protection likely to be improved from existing levels to original design levels due to improved beach levels providing reduced overtopping and protection from scour/erosion. Short term maintenance/repair of training wall undertaken until longer term scheme implemented. Allows for a more gradual transition from hold-the line to managed realignment across the two coastal units and aligns well with SMP policy.

Project name	Sidmouth and East Beach Management Plan (BMP)			
Option ID	**S1**	**S2**	**S3**	**S4**
	Will help to provide more of a transition between the hold the line along Sidmouth frontage and the managed realignment policy along East Beach. Safety of construction works to be considered especially due to landslides which cannot be controlled/foreseen along East Beach. River Sid western wall defence failure prevented through ongoing maintenance extending the lifespan of the wall beyond its residual life of 15 – 30 years until unviable and economic to continue, or when cliffs erode such that the wall becomes exposed to full coastal conditions and a new coastal standard wall is constructed.	Creation of beach along toe of cliff aided by rock groynes and beach recycling reducing rates of cliff toe erosion. Will help to provide more of a transition between the hold the line along Sidmouth frontage and the managed realignment policy along East Beach. Safety of construction works to be considered especially due to landslides which cannot be controlled/foreseen along East Beach. River Sid western wall defence failure prevented through ongoing maintenance extending the lifespan of the wall beyond its residual life of 15 – 30 years until unviable and economic to continue, or when cliffs erode such that the wall becomes exposed to full coastal conditions and a new coastal standard wall is constructed.	Creation of beach along toe of cliff aided by rock groynes and beach recycling reducing rates of cliff toe erosion. Will help to provide more of a transition between the hold the line along Sidmouth frontage and the managed realignment policy along East Beach. Safety of construction works to be considered especially due to landslides which cannot be controlled/foreseen along East Beach. River Sid western wall defence failure prevented through ongoing maintenance extending the lifespan of the wall beyond its residual life of 15 – 30 years until unviable and economic to continue, or when cliffs erode such that the wall becomes exposed to full coastal conditions and a new coastal standard wall is constructed.	River Sid western wall defence failure prevented through ongoing maintenance extending lifespan of wall beyond its residual life of 15 – 30 years until unviable and economic to continue, or when cliffs erode such that the wall becomes exposed to full coastal conditions and a new coastal standard wall is constructed. Likelihood of exposure less than other options. Removal of groynes along the shoreline, access for beach maintenance is much improved compared to other options which will have to access individual groyne bays.
Assumptions and uncertainties	Assumes no additional rock imported within Jacob's Ladder Beach and Connaught Gardens – the existing rock is removed and re-packed as necessary. All shingle to be kept within sediment cell. No shingle to be moved elsewhere. Source of beach recharge material for Sidmouth frontage not known (local or imported) and whether sufficient material exists for 100 year appraisal period. Beach recycling occurs within Frontage B (Sidmouth frontage), and removal of the training wall will allow beach material to transport into Frontage C (East Beach). Assumes that sufficient beach material exists in cell to allow re-cycling of material and groynes within East Beach to function effectively. Frequency of beach recharge and recycling assumed to be the same as other options. Additional protection measures may be required to SWW outfall. No cliff top drainage or netting and pinning is assumed along East Beach cliffs. Rock groynes along East Beach could become disconnected from the cliff face as erosion (albeit retarded) continues, and then outflanked, so periodic works would be needed to manage this. Temporary/short term works to training wall in the interim period assumes rock armour protection to toe of training wall to provide additional support, protection from scour, and reduce wave impact. Safety barriers to be provided/upgraded. The footprint of the rock however may encroach/impact on the river and the adjacent surface water outfall.	Assumes no additional rock imported within Jacob's Ladder Beach and Connaught Gardens – the existing rock is removed and re-packed as necessary. All shingle to be kept within sediment cell. No shingle to be moved elsewhere. Source of beach recharge material for Sidmouth frontage not known (local or imported) and whether sufficient material exists for 100 year appraisal period. Beach recycling occurs within Frontage B (Sidmouth frontage), and removal of the training wall will allow beach material to transport into Frontage C (East Beach). Assumed that sufficient beach material exists in cell to allow re-cycling of material and groynes within East Beach to function effectively. Frequency of beach recharge and recycling assumed to be the same as other options. Additional protection measures may be required to SWW outfall. Option may compromise amenity value and economy (including future regeneration options) of the eastern end of Sidmouth frontage due to removal of training wall and East Pier rock groyne. No cliff top drainage or netting and pinning is assumed along East Beach cliffs. Rock groynes along East Beach could become disconnected from the cliff face as erosion (albeit retarded) continues, and then outflanked, so periodic works would be needed to manage this. Temporary/short term works to training wall in the interim period assumes rock armour protection to toe of training wall to provide additional support, protection from scour, and reduce wave impact. Safety	Assumes no additional rock imported within Jacob's Ladder Beach and Connaught Gardens - the existing rock is removed and re-packed as necessary. All shingle to be kept within sediment cell. No shingle to be moved elsewhere. Source of beach recharge material for Sidmouth frontage is not known (local or imported) and whether sufficient material exists for 100 year appraisal period. Beach recycling occurs within Frontage B (Sidmouth frontage), and removal of the training wall will allow beach material to transport into Frontage C (East Beach). Assumed that sufficient beach material exists in cell to allow re-cycling of material and groynes within East Beach to function effectively. Frequency of beach recharge and recycling assumed to be the same as other options. Additional protection measures may be required to SWW outfall. Option may compromise amenity value and economy (including future regeneration options) of the eastern end of Sidmouth frontage due to removal of training wall and East Pier rock groyne. No cliff top drainage or netting and pinning is assumed along East Beach cliffs. Rock groynes along East Beach could become disconnected from the cliff face as erosion (albeit retarded) continues, and then outflanked, so periodic works would be needed to manage this. Temporary/short term works to training wall in the interim period assumes rock armour protection to toe of training wall to provide additional support, protection from scour, and reduce wave impact. Safety	Assumes no additional rock imported within Jacob's Ladder to Connaught Gardens - existing rock is removed and re-packed as necessary along frontage A. All shingle to be kept within sediment cell. No shingle to be moved elsewhere. Source of beach recharge material for Sidmouth frontage not known (local or imported) and whether sufficient material exists for 100 year appraisal period. Frequency of beach recharge and recycling assumed to be the same as other options, though could be reduced if beach is more stable as would be likely to occur, depending upon final reef layout etc. Existing rock may be able to be reused within new offshore breakwaters. Size, location etc. of offshore reefs would need to be modelled to ensure effectiveness including effectiveness during south easterlies, though guidance states that the lower the reef crest height the lower the beach level achievable along the shoreline and the smaller the salient (tombolo) that develops will be. HR Wallingford physical modelling also showed that the more angled the reefs, then the more recycling will be required as sediment is driven westwards behind reefs during south-easterly storms. Both factors would need to be considered carefully, and in particular future relationship between design reef crest height versus future sea level (which could swamp the reefs making them less effective if not designed to sufficient height form the outset). Wave induced currents may develop – to be investigated at next stage of works.

Project name	Sidmouth and East Beach Management Plan (BMP)			
Option ID	**S1**	**S2**	**S3**	**S4**
	Form of construction of existing River Sid western wall is unknown and hence extent/form of repairs that can be undertaken are uncertain. Prevention/reduction of undermining and scour to toe of structure are required as priority. Assumed that the upstream Ham Weir is sufficient and no additional works/improvements are required.	barriers to be provided/upgraded. The footprint of the rock however may encroach/impact on the river and the adjacent surface water outfall. Form of construction of existing River Sid western wall is unknown and hence extent/form of repairs that can be undertaken are uncertain. Prevention/reduction of undermining and scour to toe of structure are required as priority. Assumed that the upstream Ham Weir is sufficient and no additional works/improvements are required.	barriers to be provided/upgraded. The footprint of the rock however may encroach/impact on the river and the adjacent surface water outfall. Form of construction of existing River Sid western wall is unknown and hence extent/form of repairs that can be undertaken are uncertain. Prevention/reduction of undermining and scour to toe of structure are required as priority. Assumed that the upstream Ham Weir is sufficient and no additional works/improvements are required.	Existing outfall discharge plume may be affected by offshore reefs. Additional protection measures may be required to SWW outfall if exposed. No cliff top drainage or netting and pinning is assumed to cliffs along East Beach. Breakwaters may 'over-achieve' objective to reduce erosion rate at East Beach to prevention of erosion (resulting in negative impacts on designations) Assumes no terminal groyne is required along East Beach. If found necessary further consultation would be required. Temporary/short term works to training wall in the interim period assumes rock armour protection to toe of training wall to provide additional support, protection from scour, and reduce wave impact. Safety barriers to be provided/upgraded. The footprint of the rock however may encroach/impact on the river and the adjacent surface water outfall. Form of construction of existing River Sid western wall is unknown and hence extent/form of repairs that can be undertaken are uncertain. Prevention/reduction of undermining and scour to toe of structure are required as priority. Assumed that the upstream Ham Weir is sufficient and no additional works/improvements are required.
Approaches to adaptation	Rock from temporary works to training wall could be reused in final solution. Increased quantities of beach material required to maintain standard of protection as sea levels rise. Beach recycling/recharge occurs within the Sidmouth frontage, and removal of the training wall will allow beach material to transport into East Beach where it is assumed that sufficient beach material exists in that cell to allow re-cycling of material and groynes to function effectively. River Sid western wall height could be raised in one go or in stages in response to actual sea level rise observed and rate of erosion along East Beach leading to exposure of the western wall.	Rock from temporary works to training wall could be reused in final solution. Source of beach re-charge material for Sidmouth frontage not known (local or imported) and whether sufficient material exists for 100 year appraisal period. Beach recycling/recharge occurs within the Sidmouth frontage, and removal of the training wall will allow beach material to transport into East Beach where it is assumed that sufficient beach material exists in that cell to allow re-cycling of material and groynes to function effectively. River Sid western wall height could be raised in one go or in stages in response to actual sea level rise observed and rate of erosion along East Beach leading to exposure of the western wall.	Rock from temporary works to training wall could be reused in final solution. Increased quantities of beach material required as sea levels rise to maintain standard of protection. Beach recharge and or recycling occurs within the Sidmouth frontage, and removal of the training wall will allow beach material to transport into East Beach. Assumed that sufficient beach material will exist within East Beach cell to allow re-cycling of material and groynes to function effectively. River Sid western wall height could be raised in one go or in stages in response to actual sea level rise observed and rate of erosion along East Beach leading to exposure of the western wall.	Rock from temporary works to training wall and existing structures could be reused in final solution. Increased quantities of beach material required as sea levels rise to maintain standard of protection along Sidmouth frontage. River Sid western wall height could be raised in one go or in stages in response to actual sea level rise observed and rate of erosion along East Beach leading to exposure of the western wall. However, risk of exposure is likely to be less compared to other options, and it may even mean the wall does not need to be upgraded to full coastal standard (or at least not over so much of its length).
Costs and Benefit:Cost assessment and Partnership Funding Scores	Cost = £11,004k including 60% optimism bias *(Capital: 77%; Revenue: 23%)* Benefit Cost Ratio = 6.0 PF Score = 36% (£7,073k required)	Cost - £16,410k including 60% optimism bias *(Capital: 85%; Revenue: 15%)* Benefit Cost Ratio – 4.0 PF Score = 24% (£12,479k required)	Cost - £14,566k including 60% optimism bias *(Capital: 83%; Revenue: 17%)* Benefit Cost Ratio – 4.5 PF Score = 27% (£10,635k required)	Cost - £19,894k including 60% optimism bias *(Capital: 90%; Revenue: 10%)* *NOTE: reuse of existing rock from groynes into breakwaters may provide minor overall cost saving.* Benefit Cost Ratio – 3.3 PF Score = 20% (£15,963k required)

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Option ID	**S1**	**S2**	**S3**	**S4**
Economic Impacts				
Properties	**Description and quantification of impacts** Hinterland would be protected. No residential or commercial properties would be lost to erosion within 100 years. Residential and commercial properties at flood risk (Total for B.0 and D.0 linked flood risk area) - Improve 0.5% (1 in 200) Year 2014: no properties at risk Year 2065: no properties at risk Year 2115: no properties at risk. **Values of impacts** PV Damages - £0k **Assumptions and uncertainties** N/A	**Description and quantification of impacts** Hinterland would be protected. No residential or commercial properties would be lost to erosion within 100 years. Residential and commercial properties at flood risk (Total for B.0 and D.0 linked flood risk area) - Improve 0.5% (1 in 200) Year 2014: no properties at risk Year 2065: no properties at risk Year 2115: no properties at risk. **Values of impacts** PV Damages: £0k **Assumptions and uncertainties** N/A	**Description and quantification of impacts** Hinterland would be protected. No residential or commercial properties would be lost to erosion within 100 years. Residential and commercial properties at flood risk (Total for B.0 and D.0 linked flood risk area) - Improve 0.5% (1 in 200) Year 2014: no properties at risk Year 2065: no properties at risk Year 2115: no properties at risk. **Values of impacts** PV Damages: £0k **Assumptions and uncertainties** N/A	**Description and quantification of impacts** Hinterland would be protected. No residential or commercial properties would be lost to erosion within 100 years. Residential and commercial properties at flood risk (Total for B.0 and D.0 linked flood risk area) - Improve 0.5% (1 in 200) Year 2014: no properties at risk Year 2065: no properties at risk Year 2115: no properties at risk. **Values of impacts** PV Damages: £0k **Assumptions and uncertainties** N/A
Infrastructure	**Description and quantification of impacts** Option protects SW Coast Path National Trail, beach huts and Connaught Gardens from erosion. Option protects tourism and amenity interests. May help reduce impact on Alma Bridge and River Sid western wall for a period of time, but likely only delay impacts rather than prevent. No other infrastructure would be lost, including the SWW pumping station that serves the wider Sidmouth area. **Values of impacts** N/A **Assumptions and uncertainties** N/A	**Description and quantification of impacts** Option protects SW Coast Path National Trail, beach huts and Connaught Gardens from erosion. Option protects tourism and amenity interests. May help reduce impact on Alma Bridge and River Sid western wall for a period of time, but likely only delay impacts rather than prevent. No other infrastructure would be lost, including the SWW pumping station that serves the wider Sidmouth area. **Values of impacts** N/A **Assumptions and uncertainties** N/A	**Description and quantification of impacts** Option protects SW Coast Path National Trail, beach huts and Connaught Gardens from erosion. Option protects tourism and amenity interests. May help reduce impact on Alma Bridge and River Sid western wall for a period of time, but likely only delay impacts rather than prevent. No other infrastructure would be lost, including the SWW pumping station that serves the wider Sidmouth area. **Values of impacts** N/A **Assumptions and uncertainties** N/A	**Description and quantification of impacts** Option protects SW Coast Path National Trail, beach huts and Connaught Gardens from erosion. Option protects tourism and amenity interests. More likely (compared to other options) to delay impacts on Alma Bridge and River Sid western wall for longer period. No other infrastructure would be lost, including the SWW pumping station that serves the wider Sidmouth area. **Values of impacts** N/A **Assumptions and uncertainties** N/A
Transport	**Description and quantification of impacts** No transport links would be lost. **Values of impacts** N/A **Assumptions and uncertainties** N/A	**Description and quantification of impacts** No transport links would be lost. **Values of impacts** N/A **Assumptions and uncertainties** N/A	**Description and quantification of impacts** No transport links would be lost. **Values of impacts** N/A **Assumptions and uncertainties** N/A	**Description and quantification of impacts** No transport links would be lost. **Values of impacts** N/A **Assumptions and uncertainties** N/A
Development	**Description and quantification of impacts** Increased standard of flood risk protection increases potential for future development within the Sidmouth frontage although predicted long term loss of beach	**Description and quantification of impacts** Increased standard of flood risk protection increases potential for future development within the Sidmouth frontage although predicted long term loss of beach	**Description and quantification of impacts** Increased standard of flood risk protection increases potential for future development within the Sidmouth frontage although predicted long term loss of beach	**Description and quantification of impacts** Increased standard of flood risk protection increases potential for future development within the Sidmouth frontage although predicted long term loss of beach

Project name	Sidmouth and East Beach Management Plan (BMP)			
Option ID	**S1**	**S2**	**S3**	**S4**
	may influence development types if assumed regular beach recharge and recycling does not occur. **Values of impacts** N/A **Assumptions and uncertainties** N/A	may influence development types if assumed regular beach recharge and recycling does not occur. **Values of impacts** N/A **Assumptions and uncertainties** N/A	may influence development types if assumed regular beach recharge and recycling does not occur. **Values of impacts** N/A **Assumptions and uncertainties** N/A	may influence development types if assumed regular beach recharge and recycling does not occur. **Values of impacts** N/A **Assumptions and uncertainties** N/A
Coastal Process Impacts				
Coastal processes	**Description and quantification of impacts** The short 'I' shaped groynes will stabilise the sediment in the bay while still allowing sediment transfer between frontage B and C – direction of transport and volumes will obviously depend upon prevailing conditions. Although this may have benefits with respect to frontage C, it may result in more volatile beaches at the eastern end of the Sidmouth frontage, which will need to be addressed through beach recycling/ recharge. The 'I' shaped groynes will also have the advantage of allowing material to move offshore and onshore. The longer the groynes the less connectivity there will be with adjacent frontages. While the groyne needs to be long enough to stabilise the gravel upper beach any extension into the sandy lower beach may not produce any additional benefits because the sands and clays being transported offshore will not be captured by the groynes. Groyne lengths should be reduced at the downdrift end of a series to reduce the tendency for local erosion. The success of the scheme in the future will depend on the beach recharge because there is no other source of significant amounts of suitable beach material entering the system consistently. Each recharge will result in a more stable beach, with diminishing volume prevented by addition of new material. A high stable beach will reduce the amount of overwashing and overtopping affecting the hinterland as well as reducing the maintenance needed on the seawall. Recycling requirements will be informed by monitoring which will need to consider the potential for increased risk along this frontage. **Assumptions and uncertainties** Source of beach re-charge material not known (local or imported) and whether sufficient material exists for 100 year appraisal period. It would be necessary to conduct more detailed assessment before a conclusion could be reached regarding the performance of these options and the	**Description and quantification of impacts** The existing groynes extend down to a lower sandy beach, whereas the T-head extensions may reduce current-induced scour around the toe of the structure and thereby improve stability of the structure. The 'I' shaped groynes would not act to slow or stop the movement of beach sediment on/offshore were as the T-head groynes would. As a result there may be additional accretion due to reduction of wave energy at the nearshore due to diffraction, and help to reduce the amount of draw-down from the beach during storms/ winter periods. This may improve stability of the beach and thereby reduce the risk of beach levels reaching critical levels at one end of the bay under periods of prolonged uni-directional transport. Which would reduce the need for recycling of beach material on the frontage. On the eastern part of the town frontage, between East Pier Groyne and the training wall. Shorter groyne lengths may mean that sediment bypassing would increase thereby creating a more mobile beach with greater interaction with East Beach (however likely to be less than Option S1 due to the T- head groynes). This may mean that greater frequency of beach recharge is needed to maintain volumes. This could also affect the outflow of the River Sid, with upstream consequences. To the west and east, coastal processes will continue as existing. **Assumptions and uncertainties** Risk that groynes on East Beach may affect sediment supply to Pennington Point from the east. The impact of the T-head groynes on beach behaviour and coastal processes will depend upon their design. The optimum shape of the T-head groyne will affect the influence of the incident waves on sediment movement and therefore the shape that the beach conforms to. There remains a degree of uncertainty relating to potential sediment transport linkages between the eastern end of Sidmouth and East Beach across the mouth of River Sid. Without this knowledge it is difficult	**Description and quantification of impacts** The T-head groynes would stabilise much of the beach with the exception of along the beach to the east between York Groyne and the River Sid. Here the influence of the T-head extension at York Steps groyne would only have a limited influence, and therefore the shape of the beach would change significantly. Without stabilizing structures, the beach would move to a more linear form, with a shingle upper beach and sandy lower beach. With no structure at the end of the frontage, and limited interaction with the beaches to the west of York Steps, there is a risk that the beach could disappear altogether, either periodically or permanently. Without the training wall, the river mouth will be more dynamic with greater sediment interaction between the beach at the eastern end of Sidmouth and East Beach. There is a risk that the exit of the River Sid would become temporarily blocked with sediment, which could potentially increase fluvial flood risk in the town and/or require more frequent maintenance dredging. **Assumptions and uncertainties** Risk that groynes on East Beach may affect sediment supply to Pennington Point from the east. Without the training wall the beach would be more dynamic. It would not be stabilised and so likely to fluctuate in size in response to incident wave/storm conditions. There is a risk that the exit of the River Sid would become temporarily blocked with sediment, which could potentially increase fluvial flood risk in the town and/or require more frequent maintenance dredging. There would be greater interaction between the beach at the eastern end of Sidmouth and East Beach. It would be necessary to conduct more detailed assessment before a conclusion could be reached regarding the performance of these options and the	**Description and quantification of impacts** Following the removal of the groynes and the construction of a number of offshore breakwaters the morphology of the beach would change significantly, although the reefs would have a similar net affect in terms of reducing the alongshore sediment transport, albeit it through a totally different mechanism. Instead of physically retaining sediment, the reefs would reduce movement through altering the direction and size of incident waves. The beach is likely to widen behind the reefs with the formation of a series of tombolos in the lee of each breakwater. It is possible that a narrower beach would develop towards the east as the size of the rock reefs taper. Tombolos have previously formed on the landward side of the existing offshore breakwaters but in the future it would be necessary to undertake regular beach recycling and recharge in order to prevent the beach becoming too narrow between the breakwaters, although the frequency of such operations will likely be lower than for the other options. Without the training wall, the river mouth will be more dynamic with greater interaction between the beach at the eastern end of Sidmouth and East Beach. As noted above, size, height etc. of breakwater will need to be modelled to ensure effectiveness. **Assumptions and uncertainties** The size, spacing and orientation of the rock reefs, along with the rate of sediment supply and movement along the coast will determine how successful the reefs would be at retaining sediment. The degree to which the coastline is exposed to more wave penetration and therefore the energy reaching the shoreline will also be determined by these factors. Any redistribution and build up at certain points along the beach in relation to the incident wave conditions would need to be addressed through recycling.

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Option ID	**S1**	**S2**	**S3**	**S4**
	extent of potential impacts including an assessment of groyne dimensions to hold shingle at East Beach.	to be certain on what the benefits of a shorter T-head groyne at East Pier and a shorter training wall will be. It would be necessary to conduct more detailed assessment before a conclusion could be reached regarding the performance of these options and the extent of potential impacts including an assessment of groyne dimensions to hold shingle at East Beach.	extent of potential impacts including an assessment of groyne dimensions to hold shingle at East Beach.	
Environmental Impacts				
Geology Geomorphology	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 No likely long term impact to UNESCO World Heritage Site and nationally designated geological sites. Baseline conditions likely to remain at same level subject to external driving forces. A.5 No likely long term impact to UNESCO World Heritage Site and nationally designated geological sites. Baseline conditions likely to remain at same level subject to external driving forces. **B: Sidmouth Town** B.2b Shortening the training wall/east pier groyne may have a possible positive impact on UNESCO World Heritage Site and nationally designated geological sites through the promotion of natural processes. B.6 Baseline conditions will remain the same. No impact to UNESCO World Heritage Site and nationally designated geological sites. **C: East Beach** C.1b Possible long term impacts to UNESCO World Heritage Site and nationally designated geological sites reducing natural processes of erosion**.** **D: River Sid Western Wall** D.1 No likely impact on UNESCO World Heritage Site and nationally designated geological sites. **In-combination effects** Based on the assumptions of the effects from each individual option as noted above: • No in-combination effects are likely. Changes to coastal processes by the implementation of the scheme within all but East Beach sections will promote natural coastal processes rather than inhibit. No in-combination effects to UNESCO World	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 No likely long term impact to UNESCO World Heritage Site and nationally designated geological sites. Baseline conditions likely to remain at same level subject to external driving forces. A.5 No likely long term impact to UNESCO World Heritage Site and nationally designated geological sites. Baseline conditions likely to remain at same level subject to external driving forces. **B: Sidmouth Town** B.4b Possible long term impacts to UNESCO World Heritage Site and nationally designated geological sites reducing natural processes of erosion. B.6 Baseline conditions will remain the same. No impact to UNESCO World Heritage Site and nationally designated geological sites. **C: East Beach** C.1b Possible long term impacts to UNESCO World Heritage Site and nationally designated geological sites reducing natural processes of erosion. **D: River Sid Western Wall** D.1 No likely impact on UNESCO World Heritage Site and nationally designated geological sites. **In-combination effects:** Based on the assumptions of the effects from each individual option as noted above: • In-combination effects are likely. Changes to coastal processes by the implementation of the scheme are likely. In operation Sidmouth and East Beach sections combined will likely further inhibit natural coastal processes rather than promote. In-combination effects to UNESCO World Heritage Site and nationally designated	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 No likely long term impact to UNESCO World Heritage Site and nationally designated geological sites. Baseline conditions likely to remain at same level subject to external driving forces. A.5 No likely long term impact to UNESCO World Heritage Site and nationally designated geological sites. Baseline conditions likely to remain at same level subject to external driving forces. **B: Sidmouth Town** B.4d Possible impact on UNESCO World Heritage Site and nationally designated geological sites reducing natural processes of erosion. B.6 Baseline conditions will remain the same. No impact to UNESCO World Heritage Site and nationally designated geological sites. **C: East Beach** C.1b Possible long term impacts to UNESCO World Heritage Site and nationally designated geological sites reducing natural processes of erosion. **D: River Sid Western Wall** D.1 No likely impact on UNESCO World Heritage Site and nationally designated geological sites. **In-combination effects:** • In-combination effects are likely. Changes to coastal processes by the implementation of the scheme are likely. In operation Sidmouth and East Beach sections combined will likely further inhibit natural coastal processes rather than promote. In-combination effects to UNESCO World Heritage Site and nationally designated geological sites by a further reduction of natural processes of erosion is envisaged.	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 No likely long term impact to UNESCO World Heritage Site and nationally designated geological sites. Baseline conditions likely to remain at same level subject to external driving forces. A.5 No likely long term impact to UNESCO World Heritage Site and nationally designated geological sites. Baseline conditions likely to remain at same level subject to external driving forces. **B: Sidmouth Town** B.5 Possible impact on UNESCO World Heritage Site and nationally designated geological sites reducing natural processes of erosion. B.6 Baseline conditions will remain the same. No impact to UNESCO World Heritage Site and nationally designated geological sites. **C: East Beach** C.7 Possible long term impacts to UNESCO World Heritage Site and nationally designated geological sites reducing natural processes of erosion. **D: River Sid Western Wall** D.1 No likely impact on UNESCO World Heritage Site and nationally designated geological sites. **In-combination effects:** • In-combination effects are likely. Changes to coastal processes by the implementation of the scheme are likely. In operation Sidmouth and East Beach sections combined will likely further inhibit natural coastal processes rather than promote. In-combination effects to UNESCO World Heritage Site and nationally designated geological sites by a further reduction of natural processes of erosion is envisaged.

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	Heritage Site and nationally designated geological are envisaged. **Assumptions and uncertainties** Further investigation of coastal processes implications will be required during detailed design appraisal.	geological sites by a further reduction of natural processes of erosion is envisaged. **Assumptions and uncertainties** Further investigation of coastal processes implications will be required during detailed design appraisal. Potential for archaeological finds. Any groundworks may expose and/or damage archaeological finds.	**Assumptions and uncertainties** Further investigation of coastal processes implications will be required during detailed design appraisal. Potential for archaeological finds. Any groundworks may expose and/or damage archaeological finds.	**Assumptions and uncertainties** Further investigation of coastal processes implications will be required during detailed design appraisal.
Water quality	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 With correct construction pollution prevention measures – no change to baseline envisaged (subject to external driving forces). A.5 With correct construction pollution prevention measures – no change to baseline envisaged (subject to external driving forces). **B: Sidmouth Town** B.2b Shortening of the training Wall and East Pier Groyne may release sediment into the water column and impact water quality temporarily. Chemical composition unknown. B.6 No likely impacts. **C: East Beach** C.1b With the application of best construction pollution prevention measures - no impact is likely. **D: River Sid Western Wall** D.1 Replacement of wall may result in the increase in sediments to the water column and impact water quality temporarily. Chemical composition unknown. **In-combination effects:** In-combination effects pose potential impact with these combined options. • Predicted in-combination effects from works at Sidmouth Town and River Sid western wall. Increased threat of greater chemical pollution (chemical composition unknown) by increased volume of sediment. • Greater volume of sediment may cause increased temporary sedimentation impacts. Timing may be key to reducing impacts. Construction analysis may provide detailed analysis of volume of sediment to be disturbed. Sediment analysis is required to establish chemical composition.	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 With correct construction pollution prevention measures – no change to baseline envisaged (subject to external driving forces). A.5 With correct construction pollution prevention measures – no change to baseline envisaged (subject to external driving forces). **B: Sidmouth Town** B.4b Shortening of East Pier groyne may release sediment into the water column and impact water quality temporarily. Chemical composition unknown. B.6 No likely impacts. **C: East Beach** C.1b With the application of best construction pollution prevention measures - no impact is likely. **D: River Sid Western Wall** D.1 Replacement of wall may result in the increase in sediments to the water column and impact water quality temporarily. Chemical composition unknown. **In-combination effects:** In-combination effects pose potential impact with these combined options. • Predicted in-combination effects from works at Sidmouth Town and River Sid western wall. Increased threat of greater chemical pollution (chemical composition unknown) by increased volume of sediment. • Greater volume of sediment may cause increased temporary sedimentation impacts. Timing may be key to reducing impacts Construction analysis may provide detailed analysis of volume of sediment to be disturbed. Sediment analysis is required to establish chemical composition.	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 With correct construction pollution prevention measures – no change to baseline envisaged (subject to external driving forces). A.5 With correct construction pollution prevention measures – no change to baseline envisaged (subject to external driving forces). **B: Sidmouth Town** B.4d Removal of structures may result in the increase in sediments to the water column and impact water quality temporarily. Chemical composition unknown. B.6 No likely impacts. **C: East Beach** C.1b With the application of best construction pollution prevention measures - no impact is likely. **D: River Sid Western Wall** D.1 Replacement of wall may result in the increase in sediments to the water column and impact water quality temporarily. Chemical composition unknown. **In-combination effects:** In-combination effects pose potential impact with these combined options. • Predicted in-combination effects from works at Sidmouth Town and River Sid western wall. Increased threat of greater chemical pollution (chemical composition unknown) by increased volume of sediment. • Greater volume of sediment may cause increased temporary sedimentation impacts. Timing may be key to reducing impacts Construction analysis may provide detailed analysis of volume of sediment to be disturbed. Sediment analysis is required to establish chemical composition.	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 With correct construction pollution prevention measures – no change to baseline envisaged (subject to external driving forces). A.5 With correct construction pollution prevention measures – no change to baseline envisaged (subject to external driving forces). **B: Sidmouth Town** B.5 Removal of structures and construction of breakwaters may result in the increase in sediments to the water column and impact water quality temporarily. Chemical composition unknown. May affect discharge plume of existing outfall. B.6 No likely impacts. **C: East Beach** C.7 Removal of structure may result in the increase in sediments to the water column and impact water quality temporarily. Chemical composition unknown. **D: River Sid Western Wall** D.1 Replacement of wall may result in the increase in sediments to the water column and impact water quality temporarily. Chemical composition unknown. **In-combination effects:** In-combination effects pose potential impact with these combined options. • Predicted in-combination effects from works at Sidmouth Town and River Sid western wall. Increased threat of greater chemical pollution (chemical composition unknown) by increased volume of sediment. • Greater volume of sediment may cause increased temporary sedimentation impacts. Timing may be key to reducing impacts. Construction analysis may provide detailed analysis of volume of sediment to be disturbed.

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	All possible sources of contamination need to be further identified. **Assumptions and uncertainties** N/A	All possible sources of contamination need to be further identified. **Assumptions and uncertainties** N/A	All possible sources of contamination need to be further identified. **Assumptions and uncertainties** N/A	Sediment analysis is required to establish chemical composition. All possible sources of contamination need to be further identified. **Assumptions and uncertainties** N/A
Ecology	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Possible construction impacts to BAP habitats (Coastal vegetated shingle). A.5 No possible construction impacts to BAP habitats (*Sabellaria alveolata* reefs), assuming material placed above MHWS but does pose possible smothering impacts to BAP Habitat (coastal vegetated shingle). **B: Sidmouth Town** B.2b Possible long term changes to SAC designated features (vegetated sea cliff of Atlantic and Baltic Coasts, Tilio-Acerion forest) from changes in erosion rates. Possible direct construction impacts to BAP habitats (Coastal vegetated shingle, Sabellaria alveolata reefs, Sub-littoral sands and gravels)/fish nursery and spawning grounds and species associated with the structures being modified. Possible impacts during construction to BAP habitats (*Sabellaria alveolata* reefs)/fish nursery and spawning grounds by disturbance of sediment during modification/shortening of training wall and East Groyne causing smothering. Possible impacts to BAP habitat (Coastal vegetated shingle) from beach recharge/ recycling B.6 Possible maintenance/ construction impacts to BAP habitats (Coastal vegetated shingle). **C: East Beach** C.1b Possible long term changes to SAC designated features (vegetated sea cliff of Atlantic and Baltic Coasts, Tilio-Acerion forest) and BAP Habitat (maritime cliffs and slopes) from changes in erosion rates on the cliff habitat. Possible construction impacts to SAC designated features (Annual vegetation of drift lines) and BAP habitats (Coastal vegetated shingle, *Sabellaria alveolata* reefs, Sub-littoral sands and gravels) associated with the beach and below MHW during construction of structures.	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Possible construction impacts to BAP habitats (Coastal vegetated shingle). A.5 No possible construction impacts to BAP habitats (*Sabellaria alveolata* reefs), assuming material placed above MHWS but does pose possible smothering impacts to BAP Habitat (vegetated shingle). **B: Sidmouth Town** B.4b Possible long term changes to SAC designated features (vegetated sea cliff of Atlantic and Baltic Coasts, Tilio-Acerion forest) from changes in erosion rates. Possible direct construction and long term impacts to BAP habitats (Coastal vegetated shingle, Sabellaria alveolata reefs, Sub-littoral sands and gravels)/fish nursery and spawning grounds and species associated with the structure being modified. Possible impacts during construction to BAP habitats (*Sabellaria alveolata* reefs)/fish nursery and spawning grounds by disturbance of sediment during removal/re-construction of training wall/ modification of groynes causing smothering. Possible impacts to BAP habitat (Coastal vegetated shingle) from beach recharge/ recycling. B.6 Possible maintenance/ construction impacts to BAP habitats (Coastal vegetated shingle). **C: East Beach** C.1b Possible long term changes to SAC designated features (vegetated sea cliff of Atlantic and Baltic Coasts, Tilio-Acerion forest) and BAP Habitat (from maritime cliff and slopes) changes in erosion rates on the cliff. Possible construction impacts to SAC designated features (Annual vegetation of drift lines) and BAP habitats (Coastal vegetated shingle, *Sabellaria alveolata* reefs, Sub-littoral sands and gravels) associated with the beach and below MHW during construction of structures.	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Possible construction impacts to BAP habitats (Coastal vegetated shingle) A.5 No possible construction impacts to BAP habitats (*Sabellaria alveolata* reefs), assuming material placed above MHWS but does pose possible smothering impacts to BAP Habitat (vegetated shingle). **B: Sidmouth Town** B.4d Possible long term changes to SAC designated features (vegetated sea cliff of Atlantic and Baltic Coasts, Tilio-Acerion forest) from changes in erosion rates. Possible direct construction and long term impacts to BAP habitats (Coastal vegetated shingle, Sabellaria alveolata reefs, Sub-littoral sands and gravels)/fish nursery and spawning grounds and species associated with the structures being removed and modified. Possible impacts during construction to BAP habitats (*Sabellaria alveolata* reefs)/fish nursery and spawning grounds by disturbance of sediment during modification and removal of structures causing smothering. Possible impacts to BAP habitat (Coastal vegetated shingle) from beach recharge/ recycling. B.6 Possible maintenance/ construction impacts to BAP habitats (Coastal vegetated shingle). **C: East Beach** C.1b Possible long term changes to SAC designated features (vegetated sea cliff of Atlantic and Baltic Coasts, Tilio-Acerion forest) and BAP Habitat (from maritime cliff and slopes) changes in erosion rates on the cliff. Possible construction impacts to SAC designated features (Annual vegetation of drift lines) and BAP habitats (Coastal vegetated shingle) associated with the beach; and below MHW during construction of structures (*Sabellaria alveolata* reefs, Sub-littoral sands and gravels, fish spawning and nursery grounds)	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Possible construction impacts to BAP habitats (Coastal vegetated shingle). A.5 No possible construction impacts to BAP habitats (Sabellaria alveolata reefs), assuming material placed above MHWS but does pose possible smothering impacts to BAP Habitat (vegetated shingle). **B: Sidmouth Town** B.5 Possible long term changes to SAC designated features (vegetated sea cliff of Atlantic and Baltic Coasts, Tilio-Acerion forest) from changes in erosion rates. Possible direct construction and long term impacts to BAP habitats (Coastal vegetated shingle, Sabellaria alveolata reefs, Sub-littoral sands and gravels)/fish nursery and spawning grounds and species associated with the beach structures being removed. Possible impacts during construction to BAP habitats (*Sabellaria alveolata* reefs)/fish nursery and spawning grounds by disturbance of sediment during removal of beach structures causing smothering. Direct construction and possible long term impacts to BAP habitats (Sub-littoral sands and gravels)/fish nursery and spawning grounds and species associated with the soft benthic habitat during construction of offshore breakwaters. Breakwater construction would be at the detriment of loss of habitat to benthic species associated with soft sediment however construction could be of benefit to epibenthos species including BAP and species associated with rocky reef substrate for example *Sabellaria alveolata* reefs. Other species may also benefit if rock-pool type features are included in the reef construction. Long term altered changes to ecology. Possible impacts to BAP habitat (Coastal vegetated shingle) from beach recharge/ recycling. B.6 Possible maintenance/ construction impacts to BAP habitats (Coastal vegetated shingle.

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	Possible impacts to SAC designated features and BAP habitat (Annual vegetation of drift lines, coastal vegetated shingle) from beach recharge/ recycling. **D: River Sid Western Wall** D.1 No likely impact to SAC designated features or BAP habitat. **In-combination effects:** In-combination effects with these combined options pose potential increased impact to: • SAC features, Cliff: vegetated sea cliff of Atlantic and Baltic Coasts, Tilio-Acerion forest. Beach/inshore: Annual vegetation of drift lines • Potential BAP Habitats present, Cliff: maritime cliff and slopes. Beach/inshore: Coastal vegetated shingle, *Sabellaria alveolata* reefs, Sub-littoral sands and gravels • Species associated with the structures being modified Possible long term changes to cliff SAC designated features and BAP Habitat from changes in erosion rates from the modification and construction of structures. Sedimentation from works at Sidmouth Town may impact (neighbouring frontages (if works below MHWS, except River Sid Western Wall). BAP habitats above MHWS maybe be impacted by plant access to/from neighbouring frontages. **Assumptions and uncertainties** A more detailed ecological assessment will provide greater detail to inform design during detailed appraisal of final preferred option.	Possible impacts to SAC designated features and BAP habitat (Annual vegetation of drift lines, coastal vegetated shingle) from beach recharge/ recycling. **D: River Sid Western Wall** D.1 No likely impact to SAC designated features or BAP habitat. **In-combination effects:** In-combination effects with these combined options pose potential increased impact to: • SAC features, Cliff: vegetated sea cliff of Atlantic and Baltic Coasts, Tilio-Acerion forest. Beach/inshore: Annual vegetation of drift lines • Potential BAP Habitats present, Cliff: maritime cliff and slopes. Beach/inshore: Coastal vegetated shingle, *Sabellaria alveolata* reefs, Sub-littoral sands and gravels • Nursery and spawning grounds of fish species associated with the structures being modified, removed and constructed Possible long term changes to cliff SAC designated features and BAP Habitat from changes in erosion rates from the modification and construction of structures. Greater disturbance/ and increased sedimentation in the water column from combined works at Sidmouth Town and East Beach may impact each (except River Sid Western Wall) and neighbouring frontages (if works below MHWS). Timing is key to reduce impact on fish spawning/nursery grounds. BAP habitats above MHWS maybe be impacted by plant access to/from neighbouring works frontages. **Assumptions and uncertainties**. A more detailed ecological assessment will provide greater detail to inform design during detailed appraisal of final preferred option.	Possible impacts to SAC designated features and BAP habitat (Annual vegetation of drift lines, coastal vegetated shingle) from beach recharge/ recycling. **D: River Sid Western Wall** D.1 No likely impact to SAC designated features or BAP habitat. **In-combination effects:** In-combination effects with these combined options pose potential increased impact to: • SAC features, Cliff: vegetated sea cliff of Atlantic and Baltic Coasts, Tilio-Acerion forest. Beach/inshore: Annual vegetation of drift lines • Potential BAP Habitats present, Cliff: maritime cliff and slopes. Beach/inshore: Coastal vegetated shingle, *Sabellaria alveolata* reefs, Sub-littoral sands and gravels • Nursery and spawning grounds of fish species associated with the structures being modified, removed and constructed Possible long term changes to cliff SAC designated features and BAP Habitat from changes in erosion rates from the modification and construction of structures. Greater disturbance/ and increased sedimentation in the water column from works at Sidmouth Town and East Beach combined may impact each (except River Sid Western Wall) and neighbouring frontages (if works below MHWS) dependant on the tidal direction during works. Timing is key to reduce impact on fish spawning/nursery grounds. BAP habitats above MHWS maybe be impacted by plant access to/from neighbouring works frontages. **Assumptions and uncertainties** A more detailed ecological assessment will provide greater detail to inform design during detailed appraisal of final preferred option.	**C: East Beach** C.7 Possible long term changes to SAC designated features (vegetated sea cliff of Atlantic and Baltic Coasts, Tilio-Acerion forest) from changes in erosion rates. Direct construction and possible long term impacts to BAP habitats (Sub-littoral sands and gravels)/fish nursery and spawning grounds and species associated with the soft benthic habitat during construction of offshore breakwaters. Breakwater construction would be at the detriment of loss of habitat to benthic species associated with soft sediment however construction could be of benefit to epibenthos species including BAP and species associated with rocky reef substrate for example *Sabellaria alveolata* reefs. Other species may also benefit if rock-pool type features are included in the reef construction. Long term altered changes to ecology. **D: River Sid Western Wall** D.1 No likely impact to SAC designated features or BAP habitat. **In-combination effects:** In-combination effects with these combined options pose potential increased impact to: • SAC features, Cliff: vegetated sea cliff of Atlantic and Baltic Coasts, Tilio-Acerion forest. Beach/inshore: Annual vegetation of drift lines • Potential BAP Habitats present, Cliff: maritime cliff and slopes. Beach/inshore: Coastal vegetated shingle, *Sabellaria alveolata* reefs, Sub-littoral sands and gravels • Nursery and spawning grounds of fish species associated with the structures being modified, removed and constructed Possible long term changes to cliff SAC designated features and BAP Habitat from changes in erosion rates from the modification and construction of structures. Combined offshore breakwater construction at Sidmouth Town and East Beach would create an increased impact. Breakwater construction would be at the detriment of loss of habitat to benthic species associated with soft sediment however construction could be of benefit to epibenthos species including BAP and species associated with rocky reef substrate for example *Sabellaria alveolata* reefs. Other species may also benefit if rock-pool type features are included in

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				the reef construction. Long term altered changes to ecology. Greater disturbance/ and increased sedimentation in the water column from works at Sidmouth Town and East Beach combined may impact each (except River Sid Western Wall) and neighbouring frontages (if works below MHWS) dependant on the tidal direction during works. Timing is key to reduce impact on fish spawning/nursery grounds. BAP habitats above MHWS maybe be impacted by plant access to/from neighbouring works frontages. **Assumptions and uncertainties** A more detailed ecological assessment will provide greater detail to inform design during detailed appraisal of final preferred option.
Fisheries	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Possible temporary impact to launch access for commercial fishing boats and recreational beach fishing during construction. No likely impact long term. A.5 Temporary impact to recreational fishing through limited access during construction. No likely impact long term. **B: Sidmouth Town** B.2b Temporary impact during construction to launch access for commercial fishing boats and recreational beach fishing. B.6 Possible temporary impact to launch access for commercial fishing boats and recreational beach fishing during maintenance. **C: East Beach** C.1b No likely impact. **D: River Sid Western Wall** D.1 No likely impact**.** **In-combination effects:** Temporary in-combination effects to launch/landing access from construction and maintenance works if undertaken across all four frontage sections at a similar time for commercial fishing boats and recreational beach fishing. Impacts can be reduced by either timing the implementation of individual construction/maintenance actions within each frontage or reducing the length of time of impact by	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Possible temporary impact to launch access for commercial fishing boats and recreational beach fishing during construction. No likely impact long term. A.5 Temporary impact to recreational fishing through limited access during construction. **B: Sidmouth Town** B.4b Temporary impact to launch access for commercial fishing boats and recreational beach fishing during construction. B.6 Possible temporary impact to launch access for commercial fishing boats and recreational beach fishing during maintenance. **C: East Beach** C.1b No likely impact. **D: River Sid Western Wall** D.1 No likely impact. **In-combination effects:** Temporary in-combination effects to launch/landing access from construction and maintenance works if undertaken across all four frontage sections at a similar time for commercial fishing boats and recreational beach fishing. Impacts can be reduced by either timing the implementation of individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure launch access is maximised.	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Possible temporary impact to launch access for commercial fishing boats and recreational beach fishing during construction. No likely impact long term. A.5 Temporary impact to recreational fishing through limited access during construction. **B: Sidmouth Town** B.4d Temporary impact to launch access for commercial fishing boats and recreational beach fishing during construction. B.6 Possible temporary impact to launch access for commercial fishing boats and recreational beach fishing during maintenance. **C: East Beach** C.1b No likely impact. **D: River Sid Western Wall** D.1 No likely impact. **In-combination effects:** Temporary in-combination effects to launch/landing access from construction and maintenance works if undertaken across all four frontage sections at a similar time for commercial fishing boats and recreational beach fishing. Impacts can be reduced by either timing the implementation of individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure launch access is maximised.	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Possible temporary impact to launch access for commercial fishing boats and recreational beach fishing during construction. No likely impact long term. A.5 Temporary impact to recreational fishing through limited access during construction. **B: Sidmouth Town** B.5 Temporary impact to launch access for commercial fishing boats and recreational beach fishing during construction. Possible long term changes in type of fishing gear used in the inshore area where breakwater is proposed. B.6 Possible temporary impact to launch access for commercial fishing boats and recreational beach fishing during maintenance. **C: East Beach** C.7 No likely impact. Possible long term changes to inshore fisheries. May provide increased fishing ground (reef) for pelagic species, however breakwater construction may impact benthic species (loss of sediment habitat). May impact use of fishing gear usage in this area and therefore target species. **D: River Sid Western Wall** D.1 Possible temporary impact to launch access for commercial fishing boats and recreational fishing during construction. **In-combination effects:**

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	implementing actions together to ensure launch access is maximised. **Assumptions and uncertainties** N/A	**Assumptions and uncertainties** N/A	**Assumptions and uncertainties** N/A	Temporary in-combination effects to launch/landing access from construction and maintenance works if undertaken across all four frontage sections at a similar time for commercial fishing boats and recreational beach fishing. Impacts can be reduced by either timing the implementation of individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure launch access is maximised. Possible long term changes to access may be seen at East Beach. The offshore breakwater has the potential to create a hazard to vessels, and recreational fishers who may try and access it (see navigation). The structure itself may provide increased fishing ground (reef) for pelagic species, however breakwater construction may impact benthic species (loss of sediment habitat) increasing fishing potential. **Assumptions and uncertainties** N/A
Navigation	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Possible temporary landing/launch impact during construction for Sidmouth lifeboat and recreational boats. A.5 No impacts envisaged. **B: Sidmouth Town** B.2b Short term impact during construction/beach recycling activities for beach boat landing/launch. B6 Possible short term impact during maintenance for beach boat landing/launch. **C: East Beach** C.1b Short term impact during construction/beach recycling activities for beach boat landing/launch. Assuming access is incorporated into the design of any new structures. **D: River Sid Western Wall** D.1 No likely impact. **In-combination effects:** Temporary in-combination effects to launch/landing access from construction and maintenance works if undertaken across all four frontage sections at a similar time for commercial boats and recreational boats. Impacts can be reduced by either timing the implementation of individual construction/maintenance actions within each frontage	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Possible temporary landing/launch impact during construction for Sidmouth lifeboat and recreational boats. A.5 No impacts envisaged. **B: Sidmouth Town** B.4b Short term impact during construction/beach recycling activities for beach boat landing/launch. Assuming access is incorporated into the design of any new structures. B.6 Possible short term impact during maintenance for beach boat landing/launch. **C: East Beach** C.1b Short term impact during construction/beach recycling activities for beach boat landing/launch. Assuming access is incorporated into the design of any new structures. **D: River Sid Western Wall** D.1 No likely impact. **In-combination effects:** Temporary in-combination effects to launch/landing access from construction and maintenance works if undertaken across all four frontage sections at a similar time for commercial and recreational boats. Impacts can be reduced by either timing the implementation of	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Possible temporary landing/launch impact during construction for Sidmouth lifeboat and recreational boats. A.5 No impacts envisaged. **B: Sidmouth Town** B.4d Short term impact during construction/beach recycling activities for beach boat landing/launch. Assuming access is incorporated into the design of any new structures. B.6 Possible short term impact during maintenance for beach boat landing/launch. **C: East Beach** C.1b Short term impact during construction/beach recycling activities for beach boat landing/launch. Assuming access is incorporated into the design of any new structures. **D: River Sid Western Wall** D.1 No likely impact. **In-combination effects:** Temporary in-combination effects to launch/landing access from construction and maintenance works if undertaken across all four frontage sections at a similar time for commercial and recreational boats. Impacts can be reduced by either timing the implementation of	The dangers to safe navigation of structures lying just below the water surface would be significant, both to local vessels (particularly in unfavourable sea conditions) and to visitors (also refer to amenity value below). Wave induced currents may develop – to be investigated at next stage of works if carried forward. **Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Possible temporary landing/launch impact during construction for Sidmouth lifeboat and recreational boats. A.5 No impacts envisaged. **B: Sidmouth Town** B.5 Long term navigational impacts although these will be charted. B.6 Possible short term impact during maintenance for beach boat landing/launch. **C: East Beach** C.7 Long term impacts/ navigational changes although these will be charted. **D: River Sid Western Wall** D.1 No likely impact. **In-combination effects:**

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	or reducing the length of time of impact by implementing actions together to ensure launch access is maximised. **Assumptions and uncertainties** N/A	individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure launch access is maximised. **Assumptions and uncertainties** N/A	individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure launch access is maximised. **Assumptions and uncertainties** N/A	The dangers to safe navigation of structures lying just below the water surface would be significant, both to local vessels (particularly in unfavourable sea conditions) and to visitors. Wave induced currents may develop – to be investigated at next stage of works if carried forward. Long term impacts/ navigational changes will be seen with greater impact in-combination with new breakwaters at Sidmouth Town and East Beach, although these will be charted. An increased combined temporary impact may be seen during construction and maintenance actions for boat landing/launch access and recreational beach fishing across all four frontage sections. Key is either reduce impacts by timing construction/maintenance actions in stages or by reducing the length of time of impact by implementing actions together to ensure launch access is maximised. **Assumptions and uncertainties** N/A
Landscape	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Short term impact during construction. No changes to landscape or visual impact envisaged if new structure is replaced like for like. A.5 No changes to landscape or visual impact envisaged. **B: Sidmouth Town** B.2b Short term impact during construction. Shortening the training wall/East pier Groyne will see changes in the landscape long term. Maybe a positive/negative visual impact to designated features Sidmouth Town Centre Conservation Area, listed buildings, WHS, AONB, Heritage coast and NCA. B.6 Short term impact during maintenance works. No changes to landscape or visual impact envisaged. **C: East Beach** C.1b Short term impact during construction. Changes in landscape character and there will be impact to the setting of the designated features including Sidmouth Town Centre Conservation Area, listed buildings, WHS, AONB, Heritage coast and NCA. **D: River Sid Western Wall** D.1 Short term impact during construction. Changes will be seen to the landscape and there will be visual/direct impact to designated features including	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Short term impact during construction. No changes to landscape or visual impact envisaged if new structure is replaced like for like. A.5 No changes to landscape or visual impact envisaged. **B: Sidmouth Town** B.4b Short term impact during construction. Changes will be seen to the landscape and there will be visual/direct impact to designated features including Sidmouth Town Centre Conservation Area, listed buildings, WHS, AONB, Heritage coast and NCA. B.6 Short term impact during maintenance works. No changes to landscape or visual impact envisaged. **C: East Beach** C.1b Short term impact during construction. Changes in landscape character and there will be impact to the setting of the designated features including Sidmouth Town Centre Conservation Area, listed buildings, WHS, AONB, Heritage coast and NCA. **D: River Sid Western Wall** D.1 Short term impact during construction. Changes will be seen to the landscape and there will be visual/direct impact to designated features including Sidmouth Town Centre Conservation Area, listed	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Short term impact during construction. No changes to landscape or visual impact envisaged if new structure is replaced like for like. A.5 No changes to landscape or visual impact envisaged. **B: Sidmouth Town** B.4d Short term impact during construction. Changes will be seen to the landscape and there will be visual/direct impact to designated features including Sidmouth Town Centre Conservation Area, listed buildings, WHS, AONB, Heritage coast and NCA. B.6 Short term impact during maintenance works. No changes to landscape or visual impact envisaged. **C: East Beach** C.1b Short term impact during construction. Changes in landscape character and there will be impact to the setting of the designated features including Sidmouth Town Centre Conservation Area, listed buildings, WHS, AONB, Heritage coast and NCA. **D: River Sid Western Wall** D.1 Short term impact during construction. Changes will be seen to the landscape and there will be visual/direct impact to designated features including Sidmouth Town Centre Conservation Area, listed	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Short term impact during construction. No changes to landscape or visual impact envisaged if new structure is replaced like for like. A.5 No changes to landscape or visual impact envisaged. **B: Sidmouth Town** B.5 Short term impact during construction. Changes will be seen to the landscape and there will be visual/direct impact to designated features including Sidmouth Town Centre Conservation Area, listed buildings, WHS, AONB, Heritage coast and NCA. B.6 Short term impact during maintenance works. No changes to landscape or visual impact envisaged. **C: East Beach** C.7 Short term impact during construction. Changes in landscape character and there will be impact to the setting of the designated features including Sidmouth Town Centre Conservation Area, listed buildings, WHS, AONB, Heritage coast and NCA. **D: River Sid Western Wall** D.1 Short term impact during construction. Changes will be seen to the landscape and there will be visual/direct impact to designated features including Sidmouth Town Centre Conservation Area, listed

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	Sidmouth Town Centre Conservation Area, listed buildings, WHS, AONB, Heritage coast and NCA if new wall is not replaced like for like. Short term changes during maintenance/ construction. **In-combination effects:** There will be a greater combined short term visual impact during construction. Long term, a greater combined visual impact from changes at Sidmouth Town and East Beach on setting of designated and non-designated features and include Sidmouth Town Centre Conservation Area, listed buildings, WHS, East Devon AONB, East Devon Heritage Coast and the Blackdowns NCA. The construction of new rock groynes to the east of the mouth of the River Sid would introduce a man-made structure into what is a prominent view of the natural coast. **Assumptions and uncertainties** Quantification of long term impacts on setting would require a full landscape assessment as part of detailed design appraisal of a final preferred option.	buildings, WHS, AONB, Heritage coast and NCA if new wall is not replaced like for like. Short term changes during maintenance/ construction. **In-combination effects:** There will be a greater combined short term visual impact during construction. Long term, a greater combined visual impact from changes at Sidmouth Town and East Beach on setting of designated and non-designated features and include Sidmouth Town Centre Conservation Area, listed buildings, WHS, East Devon AONB, East Devon Heritage Coast and the Blackdowns NCA. The construction of new rock groynes to the east of the mouth of the River Sid would introduce a man-made structure into what is a prominent view of the natural coast. **Assumptions and uncertainties** Quantification of long term impacts on setting would require a full landscape assessment as part of detailed design appraisal of a final preferred option.	buildings, WHS, AONB, Heritage coast and NCA if new wall is not replaced like for like. Short term changes during maintenance/ construction. **In-combination effects:** There will be a greater combined short term visual impact during construction. Long term, a greater combined visual impact from changes at Sidmouth Town and East Beach on setting of designated and non-designated features and include Sidmouth Town Centre Conservation Area, listed buildings, WHS, East Devon AONB, East Devon Heritage Coast and the Blackdowns NCA. The construction of new rock groynes to the east of the mouth of the River Sid would introduce a man-made structure into what is a prominent view of the natural coast. **Assumptions and uncertainties** Quantification of long term impacts on setting would require a full landscape assessment as part of detailed design appraisal of a final preferred option.	buildings, WHS, AONB, Heritage coast and NCA if new wall is not replaced like for like. **In-combination effects:** There will be a greater combined short term visual impact during construction. Long term, a greater combined visual impact from changes at Sidmouth Town and East Beach on setting of designated and non-designated features and include Sidmouth Town Centre Conservation Area, listed buildings, WHS, East Devon AONB, East Devon Heritage Coast and the Blackdowns NCA. Impacts much the same as for Options S1, S2 and S3, though potentially greater negative impact on landscape features depending upon scale, height and number of reefs, which would need to be considered in more detailed design appraisal if selected as preferred option. The new structures would potentially have a significant landscape and seascape visual impact on the setting of WHS and AONB. **Assumptions and uncertainties** Quantification of long term impacts on setting would require a full landscape assessment as part of detailed design appraisal of a final preferred option.
Archaeology and Cultural Heritage	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Construction may unearth/ cause disturbance to non-designated Archaeology and Cultural Heritage features. Short term impacts on setting of Cultural Heritage features during construction. A.5 No long term impact to setting of Cultural Heritage features envisgaed. **B: Sidmouth Town** B.2b Construction may unearth/ cause disturbance to non-designated Archaeology and Cultural Heritage features. Possible long term impacts on setting of cultural heritage features. B6 No impacts likely. **C: East Beach** C.1b Construction may unearth/ cause disturbance designated and non-designated Archaeology and Cultural Heritage features.	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Construction may unearth/ cause disturbance to non-designated Archaeology and Cultural Heritage features. Short term impacts on setting of Cultural Heritage features during construction. A.5 No long term impact to setting of Cultural Heritage features envisaged. **B: Sidmouth Town** B.4b Construction may unearth/ cause disturbance to non-designated Archaeology and Cultural Heritage features. Possible long term impacts on setting of cultural heritage features. B6 No impacts likely. **C: East Beach** C.1b Construction may unearth/ cause disturbance designated and non-designated Archaeology and Cultural Heritage features.	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Construction may unearth/ cause disturbance to non-designated Archaeology and Cultural Heritage features. Short term impacts on setting of Cultural Heritage features during construction. A.5 No long term impact to setting of Cultural Heritage features envisaged. **B: Sidmouth Town** B.4d Construction may unearth/ cause disturbance to non-designated Archaeology and Cultural Heritage features. Possible long term impacts on setting of cultural heritage features. B6 No impacts likely. **C: East Beach** C.1b Construction may unearth/ cause disturbance designated and non-designated Archaeology and Cultural Heritage features.	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens** A.3 Construction may unearth/ cause disturbance to non-designated Archaeology and Cultural Heritage features. Short term impacts on setting of Cultural Heritage features during construction. A.5 No long term impact to setting of Cultural Heritage features envisaged. **B: Sidmouth Town** B.5 Construction may unearth/ cause disturbance to non-designated Archaeology and Cultural Heritage features. Possible long term impacts on setting of cultural heritage features. B.6 No impacts likely. **C: East Beach** C.7 Construction may unearth/ cause disturbance designated and non-designated Archaeology and Cultural Heritage features.

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	Possible impact on setting of designated and non-designated features long term. **D: River Sid Western Wall** D.1 Construction may unearth/ cause disturbance on non-designated Archaeology and Cultural Heritage features. Possible impact on setting of designated and non-designated features long term unless replaced like for like. **In-combination effects:** Potential long term, in-combination effect on the setting of cultural heritage asset. **Assumptions and uncertainties** Quantification of long term impacts on setting would require a historic/landscape assessment as part of detailed design appraisal of a final preferred option.	Possible impact on setting of designated and non-designated features long term. **D: River Sid Western Wall** D.1 Construction may unearth/ cause disturbance on non-designated Archaeology and Cultural Heritage features. Possible impact on setting of designated and non-designated features long term unless replaced like for like. **In-combination effects:** Potential long term, in-combination effect on the setting of cultural heritage asset. **Assumptions and uncertainties** Quantification of long term impacts on setting would require a historic/landscape assessment as part of detailed design appraisal of a final preferred option.	Possible impact on setting of designated and non-designated features long term. **D: River Sid Western Wall** D.1 Construction may unearth/ cause disturbance on non-designated Archaeology and Cultural Heritage features. Possible impact on setting of designated and non-designated features long term unless replaced like for like. **In-combination effects:** Potential long term, in-combination effect on the setting of cultural heritage asset. **Assumptions and uncertainties** Quantification of long term impacts on setting would require a historic/landscape assessment as part of detailed design appraisal of a final preferred option.	Possible impact on setting of designated and non-designated features long term. **D: River Sid Western Wall** D.1 Construction may unearth/ cause disturbance on non-designated Archaeology and Cultural Heritage features. Possible impact on setting of designated and non-designated features long term unless replaced like for like. **In-combination effects:** Potential long term, in-combination effect on the setting of cultural heritage asset. **Assumptions and uncertainties** Quantification of long term impacts on setting would require a historic/landscape assessment as part of detailed design appraisal of a final preferred option.
Air quality	**Description and quantification of impacts** **All Four Frontages (A, B, C, D) individually:** Impact to air quality through construction considered negligible due to small scale construction and not believed to have potential for long-term, permanent significant environmental effects. **In-combination effects:** Any in-combination effects are considered negligible. **Assumptions and uncertainties** N/A	**Description and quantification of impacts** **All Four Frontages (A, B, C, D) individually:** Impact to air quality through construction considered negligible due to small scale construction and not believed to have potential for long-term, permanent significant environmental effects. **In-combination effects:** Any in-combination effects are considered negligible. **Assumptions and uncertainties** N/A	**Description and quantification of impacts** **All Four Frontages (A, B, C, D) individually:** Impact to air quality through construction considered negligible due to small scale construction and not believed to have potential for long-term, permanent significant environmental effects. **In-combination effects:** Any in-combination effects are considered negligible. **Assumptions and uncertainties** N/A	**Description and quantification of impacts** **All Four Frontages (A, B, C, D) individually:** Impact to air quality through construction considered negligible due to small scale construction and not believed to have potential for long-term, permanent significant environmental effects. **In-combination effects:** Any in-combination effects are considered negligible. **Assumptions and uncertainties** N/A
Noise	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens:** Noise and vibration impacts resulting from construction work around Jacob's Ladder Beach and Connaught Gardens can be successfully managed through good site management measures; minimising the construction period, working during fixed day time hour's etc. **Remaining Frontages (B, C, D) individually** Noise and vibration impacts resulting from construction work may be significant due to close proximity of occupied buildings near Sidmouth Town, East Beach and River Sid western wall. May require the application of mitigation – acoustic barriers, monitoring etc. **In-combination effects:** The combination of works undertaken at each frontage together will increase noise and vibration impacts. The	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens:** Noise and vibration impacts resulting from construction work around Jacob's Ladder Beach and Connaught Gardens can be successfully managed through good site management measures; minimising the construction period, working during fixed day time hour's etc. **Remaining Frontages (B, C, D) individually** Noise and vibration impacts resulting from construction work may be significant due to close proximity of occupied buildings near Sidmouth Town, East Beach and River Sid western wall. May require the application of mitigation – acoustic barriers, monitoring etc. **In-combination effects:** The combination of works undertaken at each frontage together will increase noise and vibration impacts. The	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens:** Noise and vibration impacts resulting from construction work around Jacob's Ladder Beach and Connaught Gardens can be successfully managed through good site management measures; minimising the construction period, working during fixed day time hour's etc. **Remaining Frontages (B, C, D) individually** Noise and vibration impacts resulting from construction work may be significant due to close proximity of occupied buildings near Sidmouth Town, East Beach and River Sid western wall. May require the application of mitigation – acoustic barriers, monitoring etc. **In-combination effects:** The combination of works undertaken at each frontage together will increase noise and vibration impacts. The application of mitigation – acoustic barriers, monitoring	**Description and quantification of impacts** **A: Jacob's Ladder Beach and Connaught Gardens:** Noise and vibration impacts resulting from construction work around Jacob's Ladder Beach and Connaught Gardens can be successfully managed through good site management measures; minimising the construction period, working during fixed day time hour's etc. **Remaining Frontages (B, C, D) individually** Noise and vibration impacts resulting from construction work may be significant due to close proximity of occupied buildings near Sidmouth Town, East Beach and River Sid western wall. May require the application of mitigation – acoustic barriers, monitoring etc. **In-combination effects:** The combination of works undertaken at each frontage together will increase noise and vibration impacts. The

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	application of mitigation – acoustic barriers, monitoring etc. may be required. Impacts can be further reduced by either timing the implementation of individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure noise and vibration is impacts are minimised. **Assumptions and uncertainties** A noise and vibration assessment would inform the best strategy for timing strategy of works to minimise impact.	application of mitigation – acoustic barriers, monitoring etc. may be required. Impacts can be further reduced by either timing the implementation of individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure noise and vibration is impacts are minimised. **Assumptions and uncertainties** A noise and vibration assessment would inform the best strategy for timing strategy of works to minimise impact.	etc. may be required. Impacts can be further reduced by either timing the implementation of individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure noise and vibration is impacts are minimised. **Assumptions and uncertainties** A noise and vibration assessment would inform the best strategy for timing strategy of works to minimise impact.	application of mitigation – acoustic barriers, monitoring etc. may be required. Impacts can be further reduced by either timing the implementation of individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure noise and vibration is impacts are minimised. **Assumptions and uncertainties** A noise and vibration assessment would inform the best strategy for timing strategy of works to minimise impact.
Amenity value	**Description and quantification of impacts** **All Four Frontages (A, B, C, D) individually:** Temporary impact to SW Coast Path National Trail and National Cycle Network, and access to/on beach amenities during construction/ maintenance activities. **In-combination effects:** Potential temporary, negative in-combination effect on amenity value during construction periods. Impacts can be reduced by either timing the implementation of individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure access is maximised. Potential positive impact on amenity be ensuring beach is present through regular beach recharge and recycling. **Assumptions and uncertainties** An access assessment would inform the best strategy for timing works to minimise impact.	**Description and quantification of impacts** **All Four Frontages (A, B, C, D) individually:** Temporary impact to SW Coast Path National Trail and National Cycle Network, and access to/on beach amenities during construction/ maintenance activities. **In-combination effects:** Potential temporary, negative in-combination effect on amenity value during construction periods. Impacts can be reduced by either timing the implementation of individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure access is maximised. Potential positive impact on amenity be ensuring beach is present through regular beach recharge and recycling. **Assumptions and uncertainties** An access assessment would inform the best strategy for timing works to minimise impact.	**Description and quantification of impacts** **All Four Frontages (A, B, C, D) individually:** Temporary impact to SW Coast Path National Trail and National Cycle Network, and access to/on beach amenities during construction/ maintenance activities. **In-combination effects:** Potential temporary, negative in-combination effect on amenity value during construction periods. Impacts can be reduced by either timing the implementation of individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure access is maximised. Potential positive impact on amenity be ensuring beach is present through regular beach recharge and recycling. **Assumptions and uncertainties** An access assessment would inform the best strategy for timing works to minimise impact.	**Description and quantification of impacts** **All Four Frontages (A, B, C, D) individually:** Temporary impact to SW Coast Path National Trail and National Cycle Network, and access to/on beach amenities during construction/ maintenance activities **B: Sidmouth Town** B5-Public safety issues: - New breakwaters may encourage beach users encouraged to swim out to the structures and then becoming cut off by the rising tide - Vessels not familiar with the details of the structure location and depth colliding with them, even in settled weather - Vessels being driven onto breakwaters in heavy weather. - Breakwaters may affect current surf conditions impacting on surf club interests. **C: East Beach** C7-Public safety issues as above. **In-combination effects:** Potential temporary, negative in-combination effect on amenity value during construction periods. Potential long term, in-combination effect on safety from the construction of offshore breakwaters at Sidmouth Town and East Beach, may encourage swimming between them may encourage swimming between them, pose vessel safety issues and reduce surfability of area. Impacts can be reduced by either timing the implementation of individual construction/maintenance actions within each frontage or reducing the length of time of impact by implementing actions together to ensure access is maximised.

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				Potential positive impact on amenity be ensuring beach is present through regular beach recharge and recycling. **Assumptions and uncertainties** An access assessment would inform the best strategy for timing works to minimise impact.