10.0 Concept Design Principles for Car Parks within the Pebblebed Heaths

Sections in bold specifically reference the Mitigation Strategy requirements.

The principles for how car park locations have been selected are set out elsewhere in this strategy (Section 8).

This section sets out in more detail the specific design principles that have been applied in developing the car park concept designs.

- **Achieve a safe and efficient car parking layout that offers the number of car parking spaces set within the strategy to avoid increased levels of disturbance to the surrounding habitats.**
- **Establish access routes from car parks onto the Heaths that avoid disturbance to heathland birds and habitats.**
- To develop appropriately attractive car parks that reflect the landscape character of the Pebblebed Heaths in the East Devon AONB in relation to location, layout, arrangement, design, materials and subsequent management that is 'low key' and reflects the surrounding natural heathland environment. Create and maintain an appropriate experience that is easy for visitors to understand in terms of approach, entrance and parking for visitors arriving by car and which supports orientation, circulation, facilities and use of trails for people accessing the Commons.
- **Create places for the enjoyment of people of all ages, abilities and interests with the provision of some space for visitor engagement through signs - location, orientation, waymarking and interpretation, to convey key messages about the site and behaviour.**
- **In some key locations provide space for wardens to be based with a trailer or gazebo to facilitate face to face engagement opportunities to communicate key messages.**
- **Appropriate location of dog bins (so they are not so isolated that people don't use them)**, easy to access by collection companies and avoid unpleasant smells around signs and gathering areas.
- To limit capital cost of car park alterations, at the same time as ensuring low maintenance costs over the long term by reducing the potential for wear, vandalism, management and frequent maintenance.
- **Utilise the existing stone footprint, only extending into the surrounding natural SSSI vegetation in small areas where it is necessary to gain an efficiency in space or shape and to only do this by way of exchange (e.g. to exchange areas which are currently natural for areas which are currently stone parking surface).**
- Individual bays not marked but the rows for parking within are clearly defined.
- At key locations where there is an accessible trail offer some designated spaces will be included. Infrastructure such as gates will need to be amended accordingly.
- **Provide access for fire and emergency services, Royal Marines, site team and forestry wagons. As far as possible keep these entrances separate from public parking to avoid the risk of entrances being blocked.**
- Include access restrictions at entrances to visitor car parks to enable entry for cars, vans and horseboxes at key locations, but prevent access by lorries, travellers and caravans where appropriate.
- Establish and manage vegetation within and around car parks to reflect the surrounding habitat. This includes bunds and areas where, because of alterations to the layout, the existing stone surface is no longer required for parking.
- Manage gorse and other dense, shrubby vegetation to improve passive surveillance and reduce anti-social behaviour including camping, fly-tipping, theft and vandalism.

- Informal parking areas (such as Stowford, Squabmoor and Venn Ottery) will have minimal infrastructure, and measures will be introduced to prevent further encroachment at the roadside. Dog bins will be provided with minimal signage as appropriate to the location.
- Formal car parking and access roads arrangements that currently are situated within the designated Scheduled Monuments are to be relocated to prevent (Model Airfield, Woodbury Castle) parking within the protected area, in the case of Woodbury Castle this will take place in a phased manner. Earth bunds have been proposed as this protective measure can be achieved without digging. Heritage England will be consulted on the final detail design for car parks, including protection measures and working practice.

10.1 Planting Proposals

Where possible concept designs seek to retain existing trees and vegetation to help provide a mature setting to the car parks.

Appropriate tree species for car park edges

- Downy Birch (*Betula pubescens*)
- Rowan (*Sorbus aucuparia*)
- Oak (*Quercus ilex*)
- Holly (*Ilex aquifolium*),
- Hawthorn (*Crataegus monogyna*)
- Hazel (*Corylus avellana*)

Appropriate shrub and ground vegetation for car park edges

- Western and European Gorse (*Ulex* sp)
- Bell Heather (*Erica cinerea*) and common heather (*Calluna vulgaris*)

It is more important to establish the right soil conditions and allow natural regeneration to occur rather than to plant vegetative material from a list of suitable species. Suitable excavated material (including seed source) from within the car park, or from other excavations elsewhere on the Pebblebed Heaths should be carefully handled to avoid compaction.

10.2 Vegetation Management

Gorse is affecting security at some locations where it has become a dense screen around car parks. Management of gorse and other dense, shrubby vegetation needs to take place to ensure visibility from surrounding minor roads and pedestrian tracks leading to and from car parks. In this way passive surveillance will be achieved to reduce anti-social behaviour, fly-tipping, theft and vandalism. Vegetation will reduced and then maintained by mechanical cutting.

However, gorse should be retained or encouraged in some car park locations to screen parked cars from wider heathland views, to deflect dogs from running directly onto the heathland habitats and to partially obscure car parks from busy roads, where visitor numbers might inadvertently increase as a consequence of passing motorists becoming aware of a recreation opportunity they were not previously aware of.

10.3 Proposed Construction Materials

Proposed surfacing materials to include:

- Pedestrian pathways: compacted pebblebed stone.
- All-ability paths: existing pebblebed stone planed, mixed with suitable (for heathland habitat) imported aggregate, regraded and compacted to create a smoother, more tightly bound finish.
- Car parking bays and roadways: compacted pebblebed stone (see Engineering surfacing options below).
- Car park entrances: tarmac with markings. Concrete kerbs and pin kerbs for entrances off the B3180 and timber edge restraints for tarmac splays off other minor roads.

Drainage: For the purpose of this report it has been assumed that the drainage of proposed car park areas does not alter significantly from the existing situation and that surface water will continue to percolate into surrounding pebblebed soils. It has been assumed therefore that Devon County Council will not expect any flood attenuation measures to be applied to the proposals and that French drains, filter drains, natural swales and wetland scrapes included within the upgrade of each car park will act as a 'betterment' to the existing situation.

Bunds within car parks and along roadside verges will discourage verge parking. The following could be used: earth banks formed from adjacent soil material reinforced with hardwood dragons' teeth, posts/rails, or large logs. The preference by the Pebblebed Heaths Trust is to use logs; it is important to ensure that they are well secured and sufficiently large/high that car bumpers do not get lodged on them.

Timber signs, gates, fences, rails – hardwood posts for longevity. This will increase initial costs compared to softwood posts but is expected to be more economical over the longer term.

Feedback from the stakeholder consultation (Gordon Guest, Devon Countryside Access Forum) sets out the following design principles for all-ability access from car parks to surrounding trails: -

- Where cattle grazing is not taking place, but motorbike access is being discouraged chicanes are better than a gate. Haldon Forest chicane is good example (see following sheet). Some two-seater tandem scooters are now on the market, these are much longer than standard scooters and may impact on chicanes. Stockproof chicane solutions are possible.

- If a gate is needed, then disabled ramblers with tramper need a 1.5 wide gap. (See options on next sheet).

- Aston Gate – 1.5m, 2 Way wooden gate. Suitable for mobility vehicles due to the extra strength of the bottom two rails. The two-way catch, EASY LATCH and 180-degree self-closing system is suitable for users of mobility vehicles.

- Milton Keynes 1.5m metal Bridle Gate is a self-closing, two-way gate can be opened in either direction, with handle and EASY LATCH system suitable for disabled ramblers or users with mobility vehicles.

- A system for easy opening by wheelchair/tramper users developed by the Teignbridge District Council Rangers at Dawlish Countryside Park in liaison with users.

Car Park Entrance Barrier

Combination of square section steel, openable, height restriction barrier with lockable barrier at car park entrance.

Inner barrier restricting site access to vehicles.

Aston Gate – 1.5m, 2 Way
Suitable for mobility vehicles due to the extra strength of the bottom two rails. The two-way catch, EASY LATCH and 180 degree self closing system is suitable for users of mobility vehicles.

Milton Keynes 1.5m Bridle Gate
Self closing, two-way gate can be opened in either direction, with handle and EASY LATCH system suitable for disabled ramblers or users with mobility vehicles.

Road Crossing Corral preventing motor bike access, but allowing mobility vehicles.

10.4 Engineering principles

Civil Engineering advice was sought from Richard Barrass.

A site visit by Kim Strawbridge, Sam Bridgewater (part), Roger Worthington and Richard Barrass was undertaken on 28th March 2019 to Four Firs, Warren, Joney's Cross as typical examples of car parks on the Pebblebed Heaths. The following section of this report relates to this limited study.

Civil Engineering advice received is that it is always recommended to upgrade when car park works are undertaken, so that the quality of materials, construction depths, workmanship and subsequent maintenance regimes can be assured. However, in the case of the existing car parks on the Pebblebed Heaths the cost and impacts (e.g. of overlaying new imported material) are likely to be significant without the corresponding benefits because: -

- The existing surface is very robust and fit for purpose.
- The existing surface is permeable (apart from those locations where the falls across the car park are too slack and poor-quality material has been used to fill potholes, or as a surface dressing).
- The existing, uneven pebble surface results in drivers travelling slowly around the car parks, thereby producing less wear.
- Location within the SSSI limits alternative material choice.

The various engineering options are presented in the following tables. These provide the detail behind the recommendations and cost estimates. As indicated, these are cost estimates based on concept designs. Some contingency should be included to allow for currently unknown elements (e.g. ground conditions, percolation rates, lack of detailed survey / topographic data). It is possible to reduce the risk arising from these uncertainties, but the relatively simple nature of the work involved could make covering these items off more costly than is necessary. A simple tendering approach with sufficiently developed design drawings, specifications and rates against work schedules is deemed appropriate, if a suitably qualified and experienced Engineer is employed to contract manage a competent contractor.

Whilst upgrading all formal car parks to a tarmac finish would result in the solution requiring the least maintenance it would not be in keeping with the countryside context and would receive negative public reaction. It is recommended that a combination of approaches be deployed to achieve the most cost-effective solution that is in keeping with the countryside character. All finishes will require some on-going inspection and low-cost maintenance.

Because the Pebblebed car parks are constructed with large granular material, their condition will be subject to change and none of the techniques described will give a permanent long-term solution. Site managers must anticipate some degree of deterioration that will require further intervention, or level of maintenance.

A routine inspection regime will be required to identify any minor maintenance (e.g. small potholes). A nominal budget should be set to deliver annual maintenance including drainage, re-profiling and imported stone to patch holes.

The following tables set out the main Engineering Principles for creating car parks on the Heaths.

Table 17 gives the engineering design requirements for various vehicles.

Table 17. Vehicle engineering requirements for Concept Design							
Layouts for various vehicles	**Coach**	**6 tonne RM lorry**	**Fire Engine**	**Timber wagon**	**Maintenance vehicle & trailer (say Landrover)**	**Transit/VW type camper**	**Car**
Vehicle sizes	**L12.2m x W2.44m**	**Specific requirements not found. Assumption of L12m x W2.55m for the response below**	**L12.5m x W2.3m 12 tonne**	**Rigid L12m x W2.55m. Articulated Lorry L18.75m x W2.55m**	**Land Rover Crew cab L4.6m x W1.8m. Typical Trailer L3.78m x W1.81m**	**Typical Transit van L5.4m x 2.4m**	
Turning circles Inner radius and track width	Access minimum of R11m W5m onto public highway this to allow reduce impingement onto opposite carriageway. Increased bell mouth will require consultation with the Highways Authority and possible Planning Permission through Planning Inspectorate. Design coach turning by forward movement only, otherwise banksman to assist, especially in public areas.	Access minimum of R11m W5m onto public highway this to allow reduce impingement onto opposite carriageway. Increased bell mouth will require consultation with the Highways Authority and possible Planning Permission through Planning Inspectorate.	Access minimum of R11m W5m onto public highway this to allow reduce impingement onto opposite carriageway. Increased bell mouth will require consultation with the Highways Authority and possible Planning Permission through Planning Inspectorate.	Access minimum of R11m W5m onto public highway this to allow reduce impingement onto opposite carriageway. Increased bell mouth will require consultation with the Highways Authority and possible Planning Permission through Planning Inspectorate.	Access minimum of R6m W3.5m onto public highway this to allow reduce impingement onto opposite carriageway. Increased bell mouth will require consultation with the Highways Authority and possible Planning Permission through Planning Inspectorate.	Access minimum of R6m W3.5m onto public highway this to allow reduce impingement onto opposite carriageway. Increased bell mouth will require consultation with the Highways Authority and possible Planning Permission through Planning Inspectorate.	2m inner radius
Entrance Arrangements (e.g. how far back from the public road edge should a barrier be so that a vehicle pulling off the road does not obstruct traffic).	Barrier to be set back to allow for maximum vehicle length (i.e. Low loader or Articulated lorry) to safely pull on/off the Public road and safely open/ close barrier. 25m would be the maximum to facilitate all vehicle types. Visibility splay to meet the requirements of the road classification as per the HA design guide. Barrier could be unlocked by prior arrangement.	Barrier to be set back to allow for maximum vehicle length to safely pull on/off the Public road and safely open/close barrier. 25m would be the maximum to facilitate all vehicle types. Visibility splay to meet the requirements of the road classification as per the HA design guide.	Barrier to be set back to allow for maximum vehicle length to safely pull on/off the Public road and safely open/close barrier. 25m would be the maximum to facilitate all vehicle types. Visibility splay to meet the requirements of the road classification as per the HA design guide.	Barrier to be set back to allow for maximum vehicle length to safely pull on/off the Public road and safely open/close barrier. 25m would be the maximum to facilitate all vehicle types. Visibility splay to meet the requirements of the road classification as per the HA design guide.	Barrier to be set back to allow for maximum vehicle length to safely pull on/off the Public road and safely open/close barrier. 10m would be the maximum to facilitate this vehicle types.	Barrier to be set back to allow for maximum vehicle length to safely pull on/off the Public road and safely open/close barrier. 10m would be the maximum to facilitate this vehicle types.	5m long, plus 1m front and back = 7m
Single **Track Width**	Minimum of 3.5m for vehicles up to 44t. Width would need to increase on bends.	Minimum of 3.5m for vehicles up to 44t. Width would need to increase on bends.	Minimum of 3.5m for vehicles up to 44t. Width would need to increase on bends.	Minimum of 3.5m for vehicles up to 44t. Width would need to increase on bends.	Minimum of 2.5m Width would need to increase on bends.	Minimum of 2.5m Width would need to increase on bends.	2.5m wide.
Parking Spaces	Allow 18m x 3.5m for a bus to include additional turning space. With safe embark/disembark.	15m x 4m wide.	15m x 4m wide.	Layby requirement for 44t lorries adjacent to a minimum 3.5m wide road = 40m x 2.5m with 5m tapers.	10m x 3m wide.	6m x 3m wide.	5mx3m wide where there is unmarked parking. May be reduced to 4.5m long if overhang of 0.5m is created to back of bay. 6mx4m for accessible spaces.
Width & length of public road **Passing Place**	Where 'C' road width is 3.5m wide passing place needs to be 2.5m wide and 25-30m long for long vehicle to pull in. Advise/consultation with the highway authority will be required						

Table 18. Engineering construction options for car park surfaces			
Surface options	**Outline approach**	**Cost estimate £m2 or £/lm (linear metre)**	**Notes / Maintenance implications**
		Rates are current (March 2019) but subject to changes (e.g. inflation, delivery of the work / scale of work packages, development during detail design, additional planning requirements.	Some contingency should be included to allow for currently unknown elements (e.g. ground conditions, percolation rates, lack of detailed survey / topographic data). It is possible to reduce the risk arising from these uncertainties, but the relatively simple nature of the work involved could make covering these items off more costly than is necessary. A simple tendering approach with sufficiently developed design drawings, specifications and rates against work schedules is deemed appropriate, if a suitably qualified and experienced Engineer is employed to contract manage a competent contractor.
Option 1.	Accept existing surface as slightly lumpy due to irregular sized pebble material, but very robust car parking surface, with good permeability for drainage and uneven surface to discourage speed, visually appropriate in material and quality/finish. Undertake pot hole repairs where needed.	£30/m2 (for pot holes)	This option was deemed appropriate for much of Warren (entrance excluded) and Joney's Cross (existing entrance excluded).
	TYPICAL EXAMPLE Car Park area with 20 number 1m2 potholes.	£600.00	Rate to include preparation of existing surface, cutting a key for new material to tie into the existing surface, regulating and profile (where possible), supply lay and compact Type 1 to a cambered / single cross fall profile. Regular intervention may be required thoroughly the year. Key is to get the interface between new and old material to bind.
Option 2.	Excavate/plain existing material to a depth of 100mm, mix up material, replace, grade and roll. This option was deemed appropriate for sites such as Four Firs where the existing surface has become contaminated over a long period of time with a variety of stone materials.	£2/m2	This will result in an uneven surface of rounded pebbles locked with smaller aggregate. Likely to need re-grading and re-rolling every 2 years at a cost of £0.5m2. Regular low impact intervention will also be required on an annual basis to minor potholes and wear on interface between granular material and rigid pavement. This will include preparation, supply of granular material, lay and compact with whacker plate.
	TYPICAL EXAMPLE Car Park area 100m Long x 30m Width Excavation depth 100mm. Total 3000m2	£6,000.00	Depending on excavation/plaining method additional granular stone such as Type 1 may need to be imported to enable material to compact and consolidate (if there are no fines the material will not compact and leave a construction susceptible to rutting & potholes). Additional cost -Type 1 £19-22/t for a 20t load. 20t covers approx..200m2. Cost to lay £1.25/m2
Option 3.	Excavate existing material to a depth of 100mm, put through crusher, replace, grade and roll.	£5.75/m2 (an indicative rate from a contractor)	This will result in a robust, tightly bound surface with a smoother finish that may result in more wear due to faster travel. Likely to need re-grading and re-rolling every 2 years at a cost of £0.5m2.
	TYPICAL EXAMPLE Car Park area 100m Long x 30m Width. Excavation depth 100mm Total 3000m2	£17,250.00	Depending on excavation/plaining method additional granular stone such as Type 1 may need to be imported to enable material to compact and consolidate (if there are no fines the material will not compact and will leave a construction susceptible to rutting and potholing). Additional cost - Type 1 £19-22/t for a 20t load. 20t covers approximate 200m2. Cost to lay £1.25/m2
Option 4.	Option 4. Overlay existing material with 100mm of new imported gravel suitable for use on heathland habitat	£8/m2	Needs to be deep enough to ensure that the new surface binds over the top of the existing rounded pebbles, as a shallow surface dressing will wear off the rounded pebbles.
	TYPICAL EXAMPLE Car Park area 100m Long x 30m Width. Overlay depth 100mm Total 3000m2	£24,000.00	Rate to include preparation of existing surface, regulating and setting formation and profile, supply lay and compact Type 1 to a cambered / single cross fall profile.

Table 19. Engineering construction options for car parks			
Construction options	**Outline approach**	**Cost estimate £m2 or £/lm (linear metre)**	**Notes / Maintenance implications**
Other surfacing options	Blacktop surfacing to a depth of 100mm over existing.	£65-75/m2	Expensive to install, so needs to be done to the right depth, with the right edging to ensure that it doesn't degrade. Limit application to entrances and turning heads where larger vehicles (particularly RMs) are causing the greatest wear.
	TYPICAL EXAMPLE: Tarmac Car Park bell mouth L10m W4m R6m = 60m2.	£4,500.00	Rate to include preparation of existing surface, cutting a key for new material to tie into the existing surface, regulating and profile (where possible), supply lay and compact Type 1 sub-base, DBM Base Course 65mm DBM Wearing Course 35mm. To a cambered / single cross fall profile.
Edging options for surfacing	Formal edging in a countryside context creates an urban feel. When undertaking car park surface construction, a physical object is sometimes required for building surfaces against, in these situations cheap, sacrificial timber-edging is best used to provide a temporary restraint. Soil from surrounding areas can be built up to form a natural, long-term restraint.	£15/lm	Rates allow for excavation into surrounding material, timber edging with temporary pins where required and backfill with surrounding excavated material.
	Formal concrete kerbing along B road entrances and only where blacktop surfacing is being installed. On minor 'C' roads where blacktop is being installed use timber edging to form edge for laying blacktop and then ensure that earth is mounded on the outside of the timber edging to support backtop in the long term, when timber has degraded. In all other situations edging to be earth (or timber where temporary restraint is required).	HB Road kerbs £35/lm. Pin Kerbs £25/lm	Rates allow for excavation, concrete bedding and haunching. Placement and backfill behind new kerb with excavated material. **** This will require Highways authority consultation if on a junction with a public highway ****
Drainage	Filter drains - 0.5m wide x 1.0m deep backfilled with 40mm diameter clean stone, to act as linear 'soak-away' and get surface water to penetrate through any ground compaction and drain into the ground.	Filter drains £22-25/m Excavation, side casting material and filing with imported clean stone.	Rates for both filter and French based on a minimum of 100m. For both filter and French drains subject to one off event plan to replace free draining stone every 3-5 years subject to location and silt entrapment. For the purpose of this report it has been assumed that proposed car park areas do not alter significantly from existing and that surface water is percolating into surrounding pebblebed soils. It has been assumed therefore that Devon CC will not expect any flood attenuation measures to be applied to the proposals and that French drains, filter drains, natural swales and wetland scrapes included within the upgrade of each car park will act as a 'betterment' to the existing situation.
	French drains - 0.5m wide x 1.0m deep. Perforated 300mm diam. upvc pipe. Trench backfilled with 40mm diameter clean stone, to act as linear 'soak-away' and get surface water to penetrate through any ground compaction and drain into the ground.	French drains £55-65/m Excavation, side casting material, supply and lay 300mm diameter pipe and fill with imported clean stone.	
Gradients / Falls	It has been noted that where existing car parks have some slope, surface water is draining off and wear is minimal. Those car parks (or sections of car parks) where there is little gradient wet conditions are leading to ponding and pot holes. Re-grading of the offending areas, where natural slope is too slack, should be undertaken with the aim of creating enough cross-fall or camber (say 1in 60). Cross-fall/camber should be supplemented with French/Filter drains to the edges.	N/A	Where possible surface water run-off should be directed to surrounding open spaces to percolate into the adjacent ground. This will need to be achieved by forming channel / grips through berms and embankments or directed towards drains. Alternatively, subject to space availability, car park layouts may incorporate an area within the car park to act as a surface water attenuation area. This can be achieved by excavation and bunding.

Table 20. Engineering construction options for car park			
Construction principles	**Outline approach**	**Cost estimate £m2 or £/lm (linear metre)**	**Notes / Maintenance implications**
Bunding to organise parking	Bunds (vegetated banks) within car parks to subdivide bays. Minimum width of 2m otherwise visually insignificant (3m wide preferable). Bunds need to be at least 800mm high to allow for settling and to prevent 4 wheel drive vehicles destroying. Ideally needs additional measures such as timber post and rail, boulders, timber logs and in the long term trees (for shade) to discourage driving over, cycle jumping, trampling and cars overhanging vegetation. Created from material excavated on site, to achieve a sustainable no import/export balance, or elsewhere from Pebblebed heaths. Not to be imported from elsewhere. Allowed to establish with natural vegetation from seed source in relocated soil or mulched with suitable vegetation/soil arisings from other work on the Pebblebed Heaths. Avoiding gorse as much as possible, which becomes thick screening hedge causing security problems.	£5-£7.5/lm or £15/m2 Includes for cutting into existing stone by 100mm and backfilling with loose excavated material to form a mound a minimum of 800mm above ground level (to allow for settling to 600mm). Minimum bund width 2m.	Without additional measures (e.g. timber post and rail, boulders, timber logs) bunds will need reforming occasionally as they become compacted and thereby stop functioning to deter parking. FYI - Assumed all material will be generated with material sourced from site (rate shown). If not available and material requires to be imported the lm price will rise to £30/lm. (Based on sub soil / topsoil prices to date £25/t)
	Bunds adjacent to minor public roads to prevent verge parking. Created by excavator scraping verge-side soil into a mound adjacent to the Highway edge. Bunds need to be 800mm high to allow for settling to prevent 4-wheel drive vehicles parking. Ideally additional measures such as boulders, timber logs, or dragons' teeth to discourage drivers from gradually wearing the bund down. It is important that no physical object (e.g. boulder, timber log, or dragons' teeth) should be installed closer than 0.5m of the edge of the highway. That objects like boulders and logs are securely fixed/planted so that they do not move. Whilst dragon's teeth might provide a cheap and temporary solution to changing patterns of parking behaviour, they are not an attractive solution in the East Devon AONB context and will have a limited life expectancy (10-15 years) even if Sweet Chestnut poles are used.	£5/linear metre Includes forming a mound a minimum of 800mm above ground level (to allow for settling to 600mm). Minimum bund width 1.5m.	Requires banksman on public road. Without additional measures (e.g. timber post and rail, boulders, timber logs) bunds will need reforming occasionally as they become compacted and thereby stop functioning to deter parking.
Maintenance	Any of the proposed methods will not provide a permanent solution to the current condition of the car park, all will require on-going inspection and maintenance. A routine inspection regime will be required to identify any minor maintenance (e.g. small potholes). A nominal budget should be set to deliver annual maintenance including drainage, re-profiling and 20t of imported stone to patch holes.	Small car parks (£0.50 / m2) + 1x20t (£22/t) of stone. = Est. £800 Medium car parks (£0.50 / m2) + 1x20t (£22/t) of stone. = Est. £1200 5 years £10-15/m2	Small car parks - grade & roll of stone. Medium car parks - grade & roll of stone. Every 5 years – resurfacing or upgrade to surface. To include preparation, supply and lay imported aggregate. Compacted depth 100mm. Rate allows for increase in stone price.

10.5 Additional Information Relating to Engineering Advice

Highway Authority consultation will be required for: -

- Visibility splays in relation to classification of public highway.
- Pavement design and existing bell mouth / entrance from public highway.
- Kerbing along verge.
- Potential widening of access.
- Any re-located entrance / access points.
- Agree construction of tarmac detail for bell mouth including interface with public highway (stepped key or clean-cut face)

Planning Authority consultation will be required for: -

- Any car park extensions.
- Changing surfaces types.
- Potential widening of access.
- Any re-located entrance / access points.
- Changing use.

Environmental considerations

- Protected Species.
- Protected Habitat.
- Verge protections.
- Scheduled Ancient Monuments.

Materials - performance considerations

- Use of materials. Where possible locally sourced aggregates.
- pH neutral material to be used include Triassic pebblebed aggregate; Hoggin/rejects, Basalt 20-40mm, Path gravel, Granite. Golden gravel.
- The make-up of the current car parks consists of a variety of material types from shingle, limestone, tarmac, brick rubble, etc.
- Tarmac – as it joins a public highway it will have to be a DBM Base Course and Wearing Course. Minimum construction depth 100mm (65mm BC and 35mm WC).
- Recommend all aprons / bell mouths have a 10m tarmac apron to allow for safe working areas for any future maintenance. Reduces wear and tear on breaking zones and standing starts.

Profile, shape, drainage & surface considerations

- Surface water management is key for prolonging the life of car park surfaces. Introducing single crossfalls or a cambered profile will be essential. All surface water will need to be able to discharge into surrounding areas to percolate into the ground, through bunds, or into existing drainage infrastructure.
- Other potential methods include grips to low lying areas or introducing scrapes on the verge as areas to hold water to allow it to naturally soakaway in time.
- Vegetation management around the perimeter to ensure discharge of surface water.

- Re-cycling of on-site stone will not necessarily alter the levels to obtain the correct crossfall/ camber required to manage surface water.
- Once crushed or planed aggregate is (re)laid and compacted it may produce varying results in terms of how it performs under load and in extreme weather events.
- Where the option to plane/crush and relay on-site stone is deployed it is recommended that imported material is added to improve the material binding and durability.
- New material, used for patching or overlay, will need to be keyed into the current granular construction.
- Reducing large open car parking areas will reduce the likelihood of misuse by the public. Segregation using earth strips/bunds is the recommended solution.
- Where possible slacken bends to reduce wear and tear especially on access points off public highways (breaking zones and standing starts).
- Any works planned will require a settlement period. A sustained period of wet/dry conditions with no use will increase performance in the long term. It is not always easy, but worth considering the phasing of car park works at quiet, dry periods to enable this.
- All surfaces and vegetation will require some regular maintenance.